TESTS OF HATCHERY FOODS FOR SALMON, 1953 AND 1954

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United States Department of the Interior, Douglas, McKay, Secretary
Fish and Wildlife Service, John L. Farley, Director

TESTS OF HATCHERY FOODS FOR SALMON, 1953 AND 1954

by

Bobby D. Combs, David D. Palmer, John H. Finucane, and Roger E. Burrows
Fishery Research Biologists

Special Scientific Report: Fisheries No. 160

Washington, D. C.
August 1955

ABSTRACT

Feeding trials were conducted at the Salmon-Cultural Laboratory (Entiat, Wash.) during 1953 and 1954 using chinook and blueback salmon as the test animals.

One excellent diet for chinook salmon fingerlings utilizing arrow-toothed halibut (Atheresthes stomias) as a substitute for a portion of the more expensive meat components was developed during the 1953 feeding trials.

The 1954 blueback salmon feeding trials were designed to develop virus-free rations. Several diets devoid of salmon viscera, the suspect carrier, were tested and found satisfactory.

The 1954 chinook experiments were designed to study diets containing 50 percent of dry meals. No satisfactory high-meal diet was produced from these trials.

CONTENTS

	Page
Introduction	1
Conditions of Experiments	1
Results of the 1953 Experiment	1
Results of the 1954 Experiments	2
Blueback Salmon	2
Chinook Salmon	3
Summary of Results - 1953 Experiment	4
Summary of Results - 1954 Experiments	4
Blueback Salmon	4
Chinook Salmon	4
Literature Cited	5

TABLES

No.		Page
1.	Summary of 1953 feeding trials with chinook salmon--24 week period	6
2.	Summary of 1954 feeding trials with blueback salmon--24 week period	7
3.	Summary of 1954 feeding trials with chinook salmon--24 week period	8

TESTS OF HATCHERY FOODS FOR SALMON, 1953 AND 1954

INTRODUCTION

The feeding trials conducted at the Salmon-Cultural Laboratory in 1953 and 1954 were a continuation of previous experiments reported by Burrows et al. (1951), Robinson et al. (1951a), Robinson et al. (1951b), Burrows et al. (1952), and Newman et al. (1954). The objective of these trials was the same as that of the previous tests, the development of adequate, economical diets for salmon applicable to production operations.

In 1953, the work was directed toward the development of the most efficient combinations of pretested products. Although the experimental program included tests with both chinook (Oncorhynchus tshawytscha) and blueback (O. nerka) salmon fingerlings an outbreak of a virus disease in the blueback salmon forced the abandonment of this series of trials. As a result, only the chinook experiments were carried to completion. One excellent production diet was developed from these trials.

In 1954, both the chinook and blueback trials were carried through to completion. The blueback trials were directed toward the development of diets which would be virus free. The work of Watson et al. (1954) indicated that the virus infection of blueback salmon was carried in the food with salmon viscera as the suspect carrier. Two methods of approach were used: first, the evaluation of sterilized salmon viscera, and, second, the development of diets devoid of salmon viscera which were equal in growth potential and nutritional adequacy. The results of these experiments indicate that the sterilization of salmon viscera alters the feeding consistency and possibly the biological value of the protein. The second phase of these trials developed several practical production diets from which salmon viscera was eliminated.

The 1954 chinook experiments were directed toward the development of diets containing 50 percent of dry meals. Using the Cortland No. 6a meal combination as a base the meat components were varied in one part of these tests. In the second part, the meal components were varied. No satisfactory diet was developed from these trials.

CONDITIONS OF EXPERIMENTS

The methods, equipment, and techniques used were essentially the same as those described by Burrows et al. (1951; 1952). No changes were made in the 1953 experiments.

Before 1954, hemoglobin determinations were made with the Tallquist-Adams hemoglobin scale. This method involves matching a sample of raw blood against a graded color chart. Readings correspond closely to those for human blood.

In 1954 a Spencer hemoglobin meter was used to make the determinations. When this method is used the blood is hemolyzed before the color comparison is made. Amounts of hemoglobin of salmon blood proved to be approximately one-half that of human blood when the Spencer meter was used. The readings obtained for salmon blood at this laboratory, however, correspond closely to those found for trout blood using a similar method of hemoglobin determination.

With this exception, the methods, equipment, and techniques were identical and comparable to those of previous experiments.

RESULTS OF THE 1953 EXPERIMENT

Only the results of the chinook salmon experiment will be reported since an outbreak of a virus disease in the blueback salmon forced the discontinuance of those trials.

The chinook diet trials utilized previously tested products in an effort to develop efficient production diets. The feeding trials were conducted for a 24-week period. At the end of the first 12-week period, all of the diets were altered to include 10 percent of a meal mixture consisting of equal parts of seal meal and distillers solubles. Mortalities were similar in all diets and no deficiency symptoms were evident in any at the end of the experiment. The results of the 1953 experiment are summarized in Table 1.

The standard meat-viscera mixture was used as the control diet (Diet 1-C) in these trials. Arrow-toothed halibut (Atheresthes stomias) and salmon viscera were fed in combination with beef lung (Diet 2-C), with hog liver and beef lung (Diet 3-C), and with hog liver alone (Diet 4-C). The combination containing only the hog liver (Diet 4-C) produced excellent growth, equalling that of the control and exceeding significantly that of the other two diets containing arrow-toothed halibut (Diet 2-C and 3-C). Neither beef lung nor beef lung and hog liver provided as much growth stimulus as did hog liver alone in the combination.

Another fish product, hake (Merluccius productus) was fed with beef lung and salmon viscera (Diet 5-C). Significantly less growth was obtained from this diet than for a comparable one containing arrow-toothed halibut (Diet 2-C).

Two meats, hog liver and beef lung, were compared with arrow-toothed halibut when fed in combination diets with 50 percent of salmon viscera as the base. Similar gains resulted from the meat diet (Diet 6-C) and the beef lung - arrow-toothed halibut ration (Diet 2-C). The meat diet produced significantly less growth however than the hog liver - arrow-toothed halibut diet (Diet 4-C). It was concluded from these comparisons that beef lung did not provide as much impetus to the growth rate as did either hog liver or arrow-toothed halibut.

The results of this experiment indicated that the hog liver - arrow-toothed halibut - salmon-viscera mixture was equal to the standard meat-viscera diet in growth potential and could be recommended for production use. The meat-fish-viscera diet was more economical since it contained only 25 percent liver whereas two-thirds of the meat-viscera mixture was composed of relatively high cost meats. Hog liver proved superior to either beef lung or hog liver and beef lung together when these meats were fed in combination with arrow-toothed halibut and salmon viscera. Hake produced less growth response than arrow-toothed halibut in comparable mixed diets.

RESULTS OF THE 1954 EXPERIMENTS

In 1954 the blueback feeding trials were designed to test the growth potential of heat treated salmon viscera and to develop adequate hatchery diets that contained no salmon viscera. The chinook experiment was designed to test the effect of high-meal diets, 50 percent level, in the rations of chinook salmon.

Blueback Salmon

Since raw salmon viscera was suspected to be the carrier of the virus disease, two methods of approach to the problem of developing virus-free diets were explored. The first involved sterilization of the salmon viscera with heat and the second the development of efficient diets devoid of salmon viscera. Both methods were tried in the 1954 experiment. At the end of the first 12-week period all diets except Diets 4 and 12 were altered to include 10 percent of salmon offal meal. The results of the blueback trials are summarized in Table 2.

Two types of heat treatment were used in this experiment. The frozen salmon viscera was thawed and canned in No. 1 tall tins. One lot was pasteurized for 15 minutes at 50° C., the other lot cooked for 90 minutes at 100° C. It was necessary to keep the pasteurized lot in frozen storage while the cooked viscera was stored at room temperatures. The diets containing the heat-treated viscera were prepared and fed in the usual manner.

A basic mixture of 25 percent hog liver and 25 percent arrow-toothed halibut was fed with 50 percent raw viscera (Diet 1), with 50 percent pasteurized viscera (Diet 2), and with 50 percent cooked viscera (Diet 3).

The growth response from the raw viscera and the cooked product was quite similar for the first 12 weeks of the experiment. The pasteurized viscera produced significantly less growth than the other two viscera diets. Results at the end of the 24-week period, however, showed the raw viscera definitely superior to the two heat-treated products. The final weight of the cooked viscera diet (Diet 3) was significantly less than that of the diet containing raw viscera (Diet 1). Even less growth resulted from the pasteurized viscera (Diet 2).

Two factors may be responsible for the lowered growth potential of the heat-treated salmon viscera. The most obvious was the poorer feeding consistency of these products. The heat treatment apparently destroyed the binding quality of the salmon milt and therefore allowed the feed to leach. The canned viscera was more nearly comparable to the raw viscera in this respect than was the pasteurized product. Alteration of the biological value of the protein and/or destruction of essential vitamins due to heat treatment may also have been factors responsible for the poorer growth of the sterilized viscera diets. Regardless of the cause, the heat treatment resulted in an inferior product.

A diet consisting of 100 percent beef liver (Diet 4) was included merely as a comparison with the work of other investigators who use this product as a standard. The growth of fish fed this diet was exceeded significantly by all diets in the experiment except Diets 2 and 12.

Salmon viscera was eliminated from the remaining diets in the experiment (Diets 5 through 12). These diets utilized instead other fish products and meat or meat and meal combinations. Squawfish (Ptychocheilus oregonensis) and arrow-toothed halibut were compared in Diets 5 through 8. Squawfish are fairly abundant in the lower Columbia River and are known to prey on young salmon. Sufficient demand for squawfish for hatchery diets might stimulate commercial fishing for this species and thereby relieve the predator situation as well as provide a source of fish food. Arrow-toothed halibut is being used in hatchery production diets. Sufficient quantity is available to meet the demands of Pacific slope hatcheries.

Squawfish and arrow-toothed halibut were compared at the 25-percent level in combination diets containing beef liver, hog liver, and beef lung (Diets 5 and 6) and at the 50-percent level in diets containing hog liver and beef lung (Diets 7 and 8). At the 25-percent level squawfish compared favorably with arrow-toothed halibut. No significant differences in final weights of the two diets occurred. Mortalities and conversions were similar for both. The halibut diet (Diet 8) proved superior in growth production to squawfish (Diet 7) when these products were fed at the 50 percent level. At the end of 24 weeks the final weight of the Diet 8 fish was significantly higher than those of Diet 7. The amount of hemoglobin was low in the fish fed the halibut diet (Diet 8). Apparently this diet was deficient in the antianemic factor. No such deficiency was present in the squawfish diet (Diet 7).

Dry meal supplements were included in Diets 9 through 12. The hog liver - beef lung - arrow-toothed halibut mixture (Diet 8) was used as the base for three diets (Diets 9, 10, and 11), and proportional reductions in these components were made when dry meals were added. The last diet (Diet 12) contained only hog liver and beef lung with 50 percent of dry meal. This meal mix consisted of the 50 percent distillers solubles and 25 percent each of wheat middlings and cottonseed meal.

Partial reconstitution of the dry meal was accomplished by adding 30 percent water to the diet during mixing. No water was added to the other three diets, (Diets 9, 10 and 11).

Salmon offal meal at the 5 percent level (Diet 9) contributed significantly more growth stimulus during the first 12-week period than did a like amount of distillers solubles (Diet 10). The control for this group (Diet 8) which contained no meal produced gains comparable to Diet 9. The addition of 10 percent of salmon offal meal to these diets during the second 12-week period did not produce any significant differences in final weights among the three diets.

Distillers solubles at the 5 percent level proved to be an excellent vitamin supplement. This product, while not contributing measurably to growth production, prevented an anemic tendency in the fish of Diet 10. The fish of both Diets 8 and 9 which did not contain distillers solubles had low amounts of hemoglobin.

The inclusion of comparatively high levels of meals, again, proved to be detrimental during the cold-water period. The addition of 15 percent of distillers solubles (Diet 11) caused a reduction in growth and an increase in mortality. The diet containing 50 percent of dry meal (Diet 12) made the poorest growth of any in the experiment. Mortalities were significantly higher than any other with the exception of Diet 11, however no deficiency symptoms were evident at the end of the 24-week period.

It may be concluded from the results of this experiment that heat treated salmon viscera was inferior to raw viscera in growth potential. Arrow-toothed halibut proved superior to squawfish in diets containing 50 percent fish products and may be considered an adequate substitute for salmon viscera in blueback salmon diets. Dry meals in excess of 5 percent did not prove satisfactory at water temperatures below 50° F. Five percent distillers solubles added to a diet was effective in preventing an anemic tendency which was found in similar diets not containing this proportion of distillers solubles.

Chinook Salmon

The emphasis in the 1954 chinook feeding trials was placed on 50 percent meal diets using previously tested rations containing 10 percent meal as controls. The Cortland No. 6 diet was used as the base and variations were made in the meal mix in one phase and in the meat components in the other phase. These diets were partially reconstituted by the addition of 30 percent water.

A coccidia-like intestinal infection caused an increase in the mortality during the first 12 weeks of the trials but was successfully controlled by sulfa therapy. Higher than normal mortalities, however, resulted and tended to obscure the results of the experiment.

The standard meat-viscera mixture with 5 percent each of seal meal and distillers solubles (Table 3, Diet 1-C) was used as one of the control diets. This diet again produced excellent growth with no deficiency symptoms. The second control (Diet 2-C) was a previously tested combination of 22.5 percent each of hog liver and arrow-toothed halibut, 45 percent of salmon viscera and 10 percent of the seal meal - distillers solubles mix. Similar results were obtained with this diet as with Diet 1-C.

The high meal diets may be divided into two groups. In the first group (Diets 3-C through 6-C) the meal components remained the same and the meats were varied. The meal mixture was essentially the Cortland No. 6a mix: equal parts of wheat middlings, cottonseed meal, distillers solubles and salmon offal meal. The Cortland No. 6 diet with 15 percent beef liver and 35 percent hog spleen (Diet 3-C) acted as the control for this group. Salmon viscera was the only meat component in Diet 4-C. Equal parts of hog liver and beef lung (Diet 5-C) and hog liver and salmon viscera (Diet 6-C) completed this group of diets.

None of the diets in the meat-variable group produced good growth but of the four, the Cortland diet (Diet 3-C) and the hog liver - salmon viscera variable (Diet 6-C) showed the best gains at the end of 12 weeks. The other two diets produced very poor growth with Diet 4-C actually losing weight. This loss of weight was due to a mortality in excess of 50 percent at the end of 12 weeks. During the sixth week, moribund fish from this diet (Diet 4-C) were examined and the presence of clubbed gills indicated a pantothenic acid deficiency.

The results at the end of the 24-week period were very similar to those at the end of 12 weeks. One diet (Diet 3-C) was discontinued during the sixteenth week when silt-clogged water inflow pipes caused a heavy mortality. The other three diets, however, maintained the same positions in amount of growth with the final weight of fish in Diet 6-C exceeding significantly those of Diets 4-C and 5-C. During the gross examination of the fish at the end of the experiment, both Diets 4-C and 6-C contained some fish with clubbed and fused gills - evidence of a previous pantothenic acid deficiency.

The hog liver - salmon viscera components remained the same in the second group of diets (Diets 6-C through 9-C) and the meal mix was varied. The Cortland meal mixture (Diet 6-C) acted as the control for this group. Seal meal was substituted for salmon offal meal in Diet 7-C. In the last two diets (Diets 8-C and 9-C) both the salmon offal meal and seal meal were deleted and the distillers solubles increased.

In the meal variable group of diets, seal meal (Diet 7-C) provided as much or more growth response than did salmon offal meal (Diet 6-C). The increased amounts of distillers solubles in Diets 8-C and 9-C however

showed a downward trend in growth production when compared with the control for this group (Diet 6-C). At the end of the 24-week period the average weight of the fish in Diet 6-C was 13.6 grams while those in Diets 8C- and 9-C averaged 11.2 grams and 8.8 grams respectively. No deficiency symptoms were observed in the fish in Diets 7-C, 8-C, or 9-C.

The fish receiving the 50 percent meal diets were reluctant to consume the feed at temperatures below 50° F. Some of the fish from each group actually starved to death rather than eat the sinking feed. During the second 12-week period when water temperatures were above 50° F. the fish fed normally. Those of Diet 7-C were especially vigorous in their feeding habits.

From the results of these feeding trials it may be concluded that meat-viscera diets with 10 percent meals were superior to 50 percent meal diets if both growth and mortality are used as the criteria. Variations of the meat components in 50 percent meal diets indicated that equal parts of hog liver and salmon viscera produced as much growth as did the Cortland combination of beef liver and hog spleen. During the cold water period the diets containing either salmon viscera as the sole raw product or hog liver and salmon viscera combined were inadequate. The substitution of seal meal for salmon offal meal in the Cortland No. 6 mixture resulted in as good or better gains. Greater amounts of distillers solubles substituted for salmon offal meal, however, apparently had a depressing effect on the growth rate.

SUMMARY OF RESULTS - 1953 EXPERIMENT

The results of the 1953 feeding trials with chinook salmon fingerlings are summarized as follows:

1. A diet consisting of 25 percent each of hog liver and arrow-toothed halibut and 50 percent salmon viscera produced excellent growth, equalling that of a more expensive diet, the standard meat-viscera production diet. This economical diet can be recommended for production use.

2. Beef lung did not provide as great a growth stimulus as did hog liver when fed in combination with arrow-toothed halibut and salmon viscera.

3. Hake proved inferior to arrow-toothed halibut when these products were fed with beef lung and salmon viscera.

SUMMARY OF RESULTS - 1954 EXPERIMENTS

The results of the 1954 feeding trials utilizing both fingerling blueback and chinook salmon may be summarized as follows:

Blueback Salmon

The following conclusions were reached for the blueback feeding trials:

1. Both pasteurized and canned viscera produced less growth than raw salmon viscera when these products were fed in comparable mixed diets. Poorer feeding consistency and possibly alteration of the protein may be factors responsible for the lowered growth potential of the sterilized products.

2. Squawfish compared favorably with arrow-toothed halibut when these products were fed at the 25 percent level in conjunction with meats, but was inferior in growth response when fed at the 50 percent level.

3. Distillers solubles at the 5 percent level proved to be an excellent vitamin supplement. Diets containing high amounts of arrow-toothed halibut and supplemented with distillers solubles at the 5 percent level can be recommended for production purposes. Similar diets not containing this vitamin supplement showed an anemic tendency at the end of 24 weeks.

4. Neither distillers solubles at the 15 percent level nor 50 percent dry meals in a diet proved satisfactory at water temperatures below 50° F.

Chinook Salmon

Despite an increased mortality due to an intestinal protozoan infection and the loss of one diet during the experiment, the following conclusions were drawn from the chinook feeding trials:

1. Diets containing 10 percent of dry meals with meats and viscera were superior to 50 percent meal diets.

2. Equal parts of hog liver and salmon viscera produced gains comparable to the Cortland combination of 15 percent beef liver and 35 percent hog spleen when fed in conjunction with 50 percent meals.

3. Seal meal sustituted for salmon offal meal in the Cortland mix provided a comparable growth response to its counterpart containing salmon offal meal.

4. Neither salmon viscera nor hog liver and salmon viscera in combination with the Cortland No. 6 meal mix was adequate during the cold water period. Fish from these diet combinations showed clubbing of the gills indicating a pantothenic acid deficiency.

5. Increased amounts of distillers solubles substituted for salmon offal meal in the Cortland No. 6 meal mixture did not result in an increase in growth rate or a reduction in mortality.

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TABLE 1.—Summary of 1953 feeding trials with chinook salmon – 24-week period

Initial number per trough: 670 fish
Initial weight per trough: 1,000 gr.
Initial average weight per fish: 1.49 gr.
Initial number per pound: 304 fish
Period 4/15/53 to 9/29/53
Average temperature: 1st 12 wks., 46.4°F; 2nd 12 wks., 54.2°F; 24 wks., 50.3°F.

Diet No.	Components	Percentage Composition	Mean diet weight in grams 12 wks.	Mean diet weight in grams 24 wks.	Per cent mortality 12 wks.	Per cent mortality 24 wks.	Conversion 12 wks.	Conversion 24 wks.	Hemoglobin g/100 ml. blood 24 weeks	Deficiency Symptoms
1-c[2]	Beef liver S[1] Hog liver Hog spleen Salmon viscera	22.2 22.2 22.2 33.4	4,069	11,058	.45	.45	2.45	2.99	13.3	None
2-c[2]	Beef lung S Arrow-toothed halibut Salmon viscera	25.0 25.0 50.0	3,965	9,799	.45	1.04	2.53	3.37	13.6	None
3-c[2]	Hog liver S Beef lung Arrow-toothed halibut Salmon viscera	12.5 12.5 25.0 50.0	3,943	9,507	.90	2.39	2.52	3.45	14.2	None
4-c[2]	Hog liver S Arrow-toothed halibut Salmon viscera	25.0 25.0 50.0	4,042	11,195	.75	1.72	2.45	2.93	14.2	None
5-c[2]	Beef lung S Hake Salmon viscera	25.0 25.0 50.0	3,568	8,026	.60	1.57	2.87	3.96	13.5	None
6-c[2]	Hog liver S Beef lung Salmon viscera	25.0 25.0 50.0	3,878	9,034	.75	1.94	2.71	3.63	13.1	None
Least difference at the 5% confidence level:			281 grs. 12 weeks	1,035 grs. 24 wks.	1.1%	2.4%				

1/ S: Salt added at the rate of 2 grams per 100 grams of ration.

2/ At the end of the first 12-week period 5% seal meal and 5% distillers solubles was added to these diets with a corresponding proportional reduction in each of the original components.

TABLE 2.—Summary of 1954 feeding trials with blueback salmon – 24-week period

Initial number per trough: 1,225 fish
Initial weight per trough: 500 gr.

Initial average weight per fish: .41 gr.
Initial number per pound: 1,111 fish

Period 4/14/54 to 9/29/54

Average temperature: 1st 12 wks., 46.0°F.: 2nd 12 wks., 52.0°F; 24 wks., 49.0°F.

Diet No.	Components	Percentage Composition	Mean diet weight in grams 12 wks.	Mean diet weight in grams 24 wks.	Per cent mortality 12 wks.	Per cent mortality 24 wks.	Conversion 12 wks.	Conversion 24 wks.	Hemoglobin g/100 ml blood 24 weeks	Deficiency Symptoms
1 1/	Hog liver S 1/ Arrow-toothed halibut Salmon viscera (raw)	25.00 25.00 50.00	3,306	13,310	3.22	3.76	2.7	2.8	7.4	None
2 2/	Hog liver S Arrow-toothed halibut 50°C. heat treated Salmon viscera	25.00 25.00 50.00	3,000	7,618	2.73	4.00	2.9	4.0	6.9	None
3 2/	Hog liver S Arrow-toothed halibut 100°C heat treated Salmon viscera	25.00 25.00 50.00	3,390	10,668	2.90	4.24	2.6	3.4	7.5	None
4	Beef liver	100.00	2,740	7,305	2.53	4.37	3.1	4.0	7.2	None
5 2/	Beef liver S Hog liver Beef lung Squawfish	25.00 25.00 25.00 25.00	3,066	9,940	2.86	3.76	2.8	3.4	6.4	None
6 2/	Beef liver S Hog liver Beef lung Arrow-toothed halibut	25.00 25.00 25.00 25.00	3,238	10,350	2.49	3.51	2.5	3.4	6.7	None
7 2/	Hog liver S Beef lung Squawfish	25.00 25.00 50.00	2,975	8,783	2.41	3.71	2.8	3.6	7.1	None
8 2/	Hog liver S Beef lung Arrow-toothed halibut	25.00 25.00 50.00	3,269	11,007	2.20	3.31	2.6	3.3	5.8	Anemic tendency
9 2/	Hog liver S Beef lung Arrow-toothed halibut Salmon offal meal	23.75 23.75 47.50 5.00	3,273	11,365	3.22	5.10	2.6	3.2	4.9	Anemic tendency
10 2/	Hog liver S Beef lung Arrow-toothed halibut Distillers solubles	23.75 23.75 47.50 5.00	3,107	10,659	3.27	4.16	2.7	3.3	7.6	None
11 2/	Hog liver S Beef lung Arrow-toothed halibut Distillers solubles	21.25 21.25 42.50 15.00	2,873	9,848	5.96	7.51	2.8	3.3	7.3	None
12	Hog liver S Beef lung Distillers solubles Wheat middlings Cottonseed meal	25.00 25.00 25.00 12.50 12.50	2,176	5,589	5.88	7.91	3.4	4.5	6.7	None
	Least difference at the 5% confidence lever:		166 grs. 12 wks	859 grs. 24 wks.	1.5%	2.4%				

1/ S: Salt added at the rate of 2 grams per 100 grams of ration.

2/ At the end of the first 12-week period 10% of flame dried salmon offal meal was added to these diets with a corresponding proportional reduction in each of the original components.

TABLE 3.--Summary of 1954 feeding trials with chinook salmon - 24-week period

Initial number per trough: 538 fish
Initial weight per trough: 1,000 gr.
Initial average weight per fish: 1.86 gr.
Initial number per pound: 244 fish
Period 4/7/54 to 9/22/54
Average temperature: 1st 12 wks., 45.7°F; 2nd 12 wks., 51.6°F; 24 wks., 48.7°F.

Diet No.	Components	Percentage composition	Mean diet weight in grams 12 wks.	Mean diet weight in grams 24 wks.	Per cent mortality 12 wks.	Per cent mortality 24 wks.	Conversion 12 wks.	Conversion 24 wks.	Hemoglobin g/100 ml. blood 24 weeks	Deficiency Symptoms
1-C	Beef liver S 1/	20.00	2,866	7,148	17.66	18.77	3.4	2.5	8.2	None
	Hog liver	20.00								
	Hog spleen	20.00								
	Salmon viscera	30.00								
	Seal meal	5.00								
	Distillers solubles	5.00								
2-C	Hog liver S	22.50	2,774	6,267	22.31	24.91	3.5	3.4	7.9	None
	Arrow-toothed halibut	22.50								
	Salmon viscera	45.00								
	Seal meal	5.00								
	Distillers solubles	5.00								
3-C	Beef liver S	15.00	1,606		26.39	.....	8.6	...	...	
	Hog spleen	35.00			Diet discontinued 8/5/54					
	Distillers solubles	12.50								
	Wheat middlings	12.50								
	Cottonseed meal	12.50								
	Salmon offal meal	12.50								
4-C	Salmon viscera S	50.00	870	1,946	59.48	84.01	2/	14.8	6.7	Clubbed and fused gills indicating previous pantothenic acid deficiency.
	Distillers solubles	12.50								
	Wheat middlings	12.50								
	Cottonseed meal	12.50								
	Salmon offal meal	12.50								
5-C	Hog liver S	25.00	1,131	2,208	39.96	61.06	37.2	8.6	6.6	None
	Beef lung	25.00								
	Distillers solubles	12.50								
	Wheat middlings	12.50								
	Cottonseed meal	12.50								
	Salmon offal meal	12.50								
6-C	Hog liver S	25.00	1,587	3,995	32.62	45.45	8.9	4.3	6.9	Clubbed and fused gills indicating previous pantothenic acid deficiency.
	Salmon viscera	25.00								
	Distillers solubles	12.50								
	Wheat middlings	12.50								
	Cottonseed meal	12.50								
	Salmon offal meal	12.50								
7-C	Hog liver S	25.00	1,948	5,227	26.95	33.46	5.7	3.5	7.6	None
	Salmon viscera	25.00								
	Distillers solubles	12.50								
	Wheat middlings	12.50								
	Cottonseed meal	12.50								
	Seal meal	12.50								
8-C	Hog liver S	25.00	1,593	3,818	27.14	36.43	8.4	4.8	7.6	None
	Salmon viscera	25.00								
	Distillers solubles	25.00								
	Wheat middlings	12.50								
	Cottonseed meal	12.50								
9-C	Hog liver S	25.00	1,522	3,132	24.54	34.11	9.6	6.2	6.4	None
	Salmon viscera	25.00								
	Distillers solubles	37.50								
	Wheat middlings	6.25								
	Cottonseed meal	6.25								
	Least difference at the 5% confidence level:		406 grs. 12 weeks	1,410 grs. 24 wks.	19.7%	30.5%				

1/ S: Salt added at the rate of 2 grams per 100 grams of ration.

2/ Fish lost weight first 12 weeks.

INT.-DEP. SRC., WASH., D.C. 65983

ZOOPLANKTON VOLUMES OFF THE PACIFIC COAST, 1954

SPECIAL SCIENTIFIC REPORT–FISHERIES No. 161

UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE

Explanatory Note

The series embodies results of investigations, usually of restricted scope, intended to aid or direct management or utilization practices and as guides for administrative or legislative action. It is issued in limited quantities for the official use of Federal, State or cooperating Agencies and in processed form for economy and to avoid delay in publication.

United States Department of the Interior, Douglas McKay, Secretary
Fish and Wildlife Service, John L. Farley, Director

ZOOPLANKTON VOLUMES OFF THE PACIFIC COAST, 1954

Prepared by

The Staff of the South Pacific Fishery Investigations
U. S. Fish and Wildlife Service

Special Scientific Report--Fisheries No. 161.

Washington, D. C.
September 1955

Zooplankton Volumes off the Pacific Coast, 1954

This report, the fifth in a series, contains a record of the volumes of zooplankton collected on the survey cruises of the California Cooperative Oceanic Fisheries Investigations off the Pacific coast of California and Baja California during 1954. Regular survey cruises were made at monthly intervals, except in September and November. The vessels participating in cruises during 1954 included the CREST, E. W. SCRIPPS, HORIZON, PAOLINA T. and SPENCER F. BAIRD, all operated by the Scripps Institution of Oceanography.

The tables in this report are designed to serve a twofold purpose: (1) to record the volumes of plankton collected during the 1954 survey cruises (columns 9 and 10), and (2) to put on record the data for all plankton tows made during 1954, including station number (column 1), location (columns 2 and 3), date and time of collection (columns 4-6), volume of water strained (column 7), and the estimated depth of the haul (column 8).

The volumes of plankton given in the following tables are "wet" volumes. Each sample was filtered from its preserving fluid and its volume determined by displacement. Two volumes are given for each station: (1) the total wet volumes standardized to the amount in 1000 cubic meters of water strained (column 9), and (2) the volume of smaller organisms after the removal of larger ones such as jellies, fish, larger mollusca, crustaceans, and squid (column 10).

The nets used in the collection of the plankton samples were the same as those used on all cruises since 1949. They were made of No. 30xxx grit gauze (an extra-strong silk bolting cloth), conical in shape, with a one-meter mouth opening, and about five meters long. The last 40 cms. of the cone, and the cod-end bags were made of No. 56xxx silk grit gauze. The procedure for taking net tows was similar to that followed since 1951. Each haul was an oblique tow made from approximately 140 meters deep to the surface (depth of water permitting).

The procedures followed in determining the volume of water strained during each haul are outlined in previous reports in this series (refer to Special Scientific Reports: Fisheries Nos. 100 and 125). The numbering system for cruises, which differs from that used in the 1949-1952 reports, is explained in Special Scientific Report: Fisheries No. 132 (Zooplankton Volumes for 1953).

The plankton samples are used in studying the early life histories (particularly the distribution and abundance of spawning and the rate of larval survival) of the sardine and other commercially important or potentially important fishes, and also in studying the productivity of sardine spawning areas. The former is being investigated by the South Pacific Fishery Investigations of the United States Fish and Wildlife Service, the latter by the Scripps Institution of Oceanography of the University of California.

These investigations are part of the California Cooperative Oceanic Fisheries Investigations, a program sponsored by the Marine Research Committee, and carried out by the Scripps Institution of Oceanography of the University of California, the Bureau of Marine Fisheries of the California Department of Fish and Game, the California Academy of Sciences, the Hopkins Marine Station of Stanford University, and the South Pacific Fishery Investigations of the Fish and Wildlife Service.

Four earlier publications deal with plankton volumes collected on survey cruises of the California Cooperative Oceanic Fisheries Investigations. These are:

STAFF, SOUTH PACIFIC FISHERY INVESTIGATIONS

1952. Zooplankton volumes off the Pacific coast, 1951. U. S. Dept. Interior, Fish and Wildlife Service, Spec. Sci. Rept.: Fisheries No. 73, 37 pp.

1953. Zooplankton volumes off the Pacific coast, 1952. U. S. Dept. Interior, Fish and Wildlife Service, Spec. Sci. Rept.: Fisheries No. 100, 41 pp.

1954. Zooplankton volumes off the Pacific coast, 1949-50. U. S. Dept. Interior, Fish and Wildlife Service, Spec. Sci. Rept.: Fisheries No. 125, 54 pp.

1954. Zooplankton volumes off the Pacific coast, 1953. U. S. Dept. Interior, Fish and Wildlife Service, Spec. Sci. Rept.: Fisheries No. 132, 38 pp.

Plankton Volumes, Cruise 5401, January 1954

Sta.	Position N.lat.	Position W.long.	(1954) Date	Time (PST) Start	Time (PST) End	Vol. water strained C.M.	Depth of haul in meters	Vol.per 1000 C.M.strained Total cc.	Vol.per 1000 C.M.strained Sm.org. cc.
77.50	35°03.4'	120°53.2'	I-9	2327	2338	430	0-96	165	165
77.55	34°54.2'	121°12.6'	I-9	2056	2110	543	0-133	140	140
80.51	34°26.5'	120°32.2'	I-10	0413	0418	218	0-32	64	64
80.55	34°17.6'	120°49.0'	I-10	0736	0750	578	0-118	31	31
80.60	34°09.6'	121°08.7'	I-10	0951	1005	495	0-144	75	75
80.70	33°48.4'	121°49.5'	I-10	1606	1620	433	0-154	69	69
80.80	33°21.5'	122°31.5'	I-10	2101	2115	550	0-120	131	131
80.90	32°57.2'	123°13.5'	I-11	0306	0321	526	0-141	59	59
80.100	32°32.0'	123°56.0'	I-11	0701	0725	562	0-121	34	34
80.110	32°25.2'	124°35.0'	I-11	1326	1341	525	0-144	50	50
82.47	34°14.3'	119°58.8'	I-8	2216	2230	547	0-128	66	66
83.40	34°13.6'	119°22.0'	I-8	1704	1707	196	0-11	117	117
83.43	34°08.0'	119°34.0'	I-8	1906	1920	525	0-144	57	57
83.48	33°57.8'	119°54.5'	I-9	0043	0050	241	0-60	87	87
83.51	33°51.6'	120°08.5'	I-9	0326	0340	478	0-126	61	61
83.55	33°40.8'	120°27.6'	I-9	0601	0616	533	0-129	103	103
83.60	33°33.0'	120°45.7'	I-9	0926	0940	557	0-132	307	307
85.39	Occupied. Sample lost								
85.40	33°56.8'	119°10.8'	I-8	1325	1341	557	0-116	41	41
85.45	33°47.0'	119°31.6'	I-8	1101	1115	528	0-144	42	42
85.50	33°27.5'	119°54.8'	I-8	0701	0715	504	0-138	113	113
85.55	33°27.5'	120°12.5'	I-8	0356	0410	543	0-145	203	203
85.60	33°16.5'	120°33.5'	I-8	0006	0021	575	0-124	226	226
87.35	33°50.0'	118°37.4'	I-5	2301	2316	614	0-88	46	46
87.40	33°39.5'	118°59.5'	I-6	0256	0311	621	0-95	35	35
87.45	33°28.5'	119°21.4'	I-6	0541	0556	543	0-117	66	66
87.50	33°20.5'	119°40.5'	I-6	0813	0820	316	0-50	32	32
87.55	33°10.2'	120°00.5'	I-7	1726	1740	559	0-125	63	63
87.60	33°01.0'	120°20.5'	I-7	2106	2120	551	0-126	196	196
90.28	33°28.5'	117°46.3'	I-14	0026	0040	564	0-110	43	43
90.30	33°24.5'	117°55.6'	I-13	2256	2310	553	0-116	63	63
90.37	33°12.0'	118°21.8'	I-13	1936	1950	611	0-101	62	62
90.45	32°54.4'	118°56.0'	I-13	1441	1455	559	0-113	43	43
90.53	32°35.0'	119°35.5'	I-13	1106	1120	489	0-142	45	45
90.60	32°27.2'	120°01.5'	I-13	0631	0645	604	0-98	167	167
90.70	32°03.8'	120°39.5'	I-13	0035	0050	547	0-125	29	29
90.80	31°44.0'	121°19.0'	I-12	1901	1916	518	0-139	89	89
90.90	31°23.5'	122°00.0'	I-12	1436	1450	564	0-101	80	80
90.100	31°03.5'	122°37.0'	I-12	0826	0841	660	0-115	39	39
90.110	30°45.0'	123°15.0'	I-12	0346	0401	525	0-145	46	46
93.27	32°56.8'	117°19.0'	I-14	0513	0521	336	0-45	48	48
93.30	32°49.5'	117°31.5'	I-14	0731	0745	510	0-119	47	47
93.40	32°28.0'	118°14.2'	I-14	1226	1240	492	0-127	47	47
93.50	32°10.0'	118°56.0'	I-14	1806	1820	494	0-132	219	219
93.60	31°48.5'	119°32.0'	I-14	2230	2245	564	0-107	603	603

Plankton Volumes, Cruise 5401, January 1954 (cont'd)

Sta.	Position N.lat.	W.long.	(1954) Date	Time (PST) Start	End	Vol. water strained C.M.	Depth of haul in meters	Vol.per 1000 C.M.strained Total cc.	Sm.org. cc.
97.30	32°14.9'	117°08.7'	I-15	1914	1918	174	0-22	34	34
97.32	32°11.5'	117°18.8'	I-15	1751	1805	495	0-129	61	61
97.40	31°54.5'	117°52.2'	I-15	1336	1350	474	0-133	78	78
97.50	31°28.0'	118°28.0'	I-15	0821	0835	560	0-107	214	214
97.60	31°14.5'	119°07.5'	I-15	0341	0356	507	0-123	67	67
100.29	31°41.9'	116°43.5'	I-15	2357	0010	474	0-127	42	42
100.30	31°40.5'	116°47.0'	I-16	0041	0055	497	0-117	38	38
100.40	31°21.0'	117°28.0'	I-16	0501	0515	520	0-123	65	65
100.50	30°59.0'	118°10.0'	I-16	1031	1045	622	0-93	222	222
100.60	30°39.0'	118°47.0'	I-16	1501	1516	509	0-122	133	133
100.70	30°19.5'	119°27.5'	I-16	2056	2111	470	0-130	215	215
100.80	29°59.0'	120°07.0'	I-17	0141	0156	593	0-105	138	138
100.90	29°33.8'	120°54.0'	I-17	0746	0801	493	0-124	49	49
103.30	31°05.5'	116°26.0'	I-22	0108	0115	241	0-71	41	41
103.35	30°55.0'	116°45.0'	I-21	2211	2226	530	0-126	75	75
103.40	30°45.0'	117°06.0'	I-20	2046	2100	509	0-122	67	67
103.50	30°23.0'	117°51.0'	I-20	1511	1526	508	0-133	71	71
103.60	30°01.0'	118°25.0'	I-20	1121	1135	577	0-111	166	166
107.32	30°26.9'	116°11.5'	I-19	1151	1205	492	0-129	57	57
107.35	30°20.4'	116°22.2'	I-19	1421	1436	476	0-138	172	172
107.40	30°11.0'	116°43.5'	I-19	1726	1740	593	0-104	71	71
107.50			Occupied. Sample spoiled						
107.60	29°26.5'	118°02.0'	I-20	0441	0455	568	0-115	84	84
110.33	29°51.2'	115°51.4'	I-19	0718	0725	276	0-54	33	33
110.35	29°46.5'	116°00.6'	I-19	0541	0555	556	0-108	36	36
110.40	29°36.8'	116°18.3'	I-19	0306	0321	492	0-124	20	20
110.50	29°14.5'	117°01.0'	I-18	2126	2140	495	0-123	57	57
110.60	28°56.0'	117°39.5'	I-18	1636	1650	535	0-114	114	114
110.70	28°35.0'	118°19.0'	I-18	1051	1105	563	0-105	44	44
110.80	28°19.5'	118°54.0'	I-18	0646	0700	474	0-128	59	59
110.90	27°57.8'	119°35.0'	I-18	0116	0130	539	0-113	126	126
110.100	27°41.5'	120°05.5'	I-17	2126	2141	516	0-121	72	72
113.30	29°22.5'	115°17.5'	I-20	0644	0648	124	0-34	81	81
113.35	29°12.0'	115°39.0'	I-20	0431	0446	467	0-139	90	90
113.40	29°02.0'	115°58.5'	I-20	0126	0140	519	0-128	46	46
113.50	28°42.0'	116°37.0'	I-19	2126	2141	(447)	0-146	72	72
117.26	28°56.0'	114°41.0'	I-19	0433	0440	257	0-63	55	55
117.30	28°46.0'	114°55.0'	I-19	0627	0638	338	0-98	24	24
117.35	28°38.0'	115°16.0'	I-19	0901	0916	474	0-125	38	38
117.40	28°28.5'	115°35.0'	I-19	1156	1210	465	0-137	34	34
117.50	28°08.0'	116°15.0'	I-19	1606	1621	449	0-137	16	16
120.25	28°23.0'	114°14.0'	I-19	0044	0048	(160)	0-37	75	75
120.30	28°13.0'	114°34.0'	I-18	2218	2226	245	0-65	57	57
120.35	28°03.0'	114°54.0'	I-18	2013	2021	246	0-65	53	53
120.45	27°43.5'	115°33.5'	I-18	1541	1556	481	0-129	37	37

Plankton Volumes, Cruise 5401, January 1954 (cont'd)

Position				Time (PST)		Vol. water strained	Depth of haul	Vol.per 1000 C.M.strained	
Sta.	N.lat.	W.long.	(1954) Date	Start	End	C.M.	in meters	Total cc.	Sm.org. cc.
120.50	27°33.5'	115°52.0'	I-18	1316	1330	(463)	0-137	35	35
120.60	27°13.0'	116°31.5'	I-18	0756	0811	461	0-136	43	43
120.70	26°54.0'	117°14.0'	I-18	0316	0330	453	0-137	115	115
120.80	26°32.0'	117°51.0'	I-17	2141	2156	493	0-125	138	138
120.120	25°12.5'	120°22.0'	I-7	1416	1430	459	0-147	78	78
123.37	27°23.5'	114°41.0'	I-16	1743	1751	267	0-63	172	172
123.40	27°18.0'	114°51.5'	I-17	0321	0335	450	0-141	182	182
123.50	26°57.5'	115°30.0'	I-17	0741	0755	482	0-131	66	66
123.60	26°37.0'	116°08.5'	I-17	1241	1255	405	0-146	94	94
127.34	26°55.0'	114°05.5'	I-16	1318	1326	237	0-71	59	59
127.40	26°44.5'	114°25.0'	I-16	1046	1101	450	0-137	107	107
127.50	26°22.0'	115°10.5'	I-16	0546	0601	460	0-155	117	117
127.60	26°03.5'	115°46.5'	I-16	0036	0050	465	0-144	103	103
130.30	26°26.5'	113°29.0'	I-15	0633	0640	241	0-72	133	133
130.35	26°19.0'	113°49.0'	I-15	0836	0851	463	0-128	91	91
130.40	26°11.5'	114°08.5'	I-15	1141	1156	435	0-148	51	51
130.50	25°50.0'	114°46.0'	I-15	1536	1550	477	0-126	84	84
130.60	25°31.0'	115°25.0'	I-15	2021	2036	419	0-148	239	239
130.110	23°48.0'	118°33.5'	I-8	0426	0441	460	0-142	26	26
133.25	26°04.5'	112°48.0'	I-15	0118	0126	262	0-66	69	69
133.30	25°55.0'	113°07.0'	I-14	2256	2311	432	0-146	46	46
133.40	25°34.5'	113°45.5'	I-14	1821	1835	508	0-128	35	35
133.50	25°13.0'	114°27.0'	I-14	1336	1350	442	0-145	72	72
137.23	25°34.0'	112°18.5'	I-13	1938	1946	247	0-70	105	105
137.30	25°21.0'	112°46.0'	I-13	2136	2251	453	0-135	106	106
137.40	25°02.5'	113°25.0'	I-14	0341	0355	455	0-141	53	53
137.50	24°39.0'	114°02.5'	I-14	0801	0816	480	0-133	54	54
137.140	21°40.0'	119°41.0'	I-8	2006	2021	451	0-137	55	55
140.30	24°46.0'	112°24.0'	I-13	1352	1403	423	0-123	123	123
140.35	24°35.5'	112°43.0'	I-13	1141	1155	488	0-127	33	33
140.40	24°27.0'	112°59.0'	I-13	0851	0906	474	0-131	17	17
140.50	24°08.5'	113°41.0'	I-13	0441	0455	466	0-143	124	124
140.110	22°06.0'	117°25.0'	I-9	1041	1056	445	0-141	36	36
143.26	24°21.5'	111°49.0'	I-12	0748	0755	249	0-67	104	104
143.30	24°13.0'	112°04.5'	I-12	0601	0615	442	0-141	104	104
143.35	24°02.0'	112°26.0'	I-12	0246	0300	471	0-138	85	85
147.20	23°55.5'	111°06.5'	I-11	1626	1640	465	0-130	142	142
147.25	23°46.5'	111°22.5'	I-11	1836	1850	439	0-135	307	307
147.30	23°38.0'	111°47.0'	I-11	2211	2226	444	0-139	338	338
147.90	21°36.0'	115°25.0'	I-10	0126	0140	436	0-139	46	46
150.19	23°23.5'	110°39.0'	I-11	1126	1141	487	0-138	152	152
150.25	23°13.0'	111°02.0'	I-11	0831	0846	442	0-148	208	208
150.30	23°04.5'	111°22.0'	I-11	0526	0541	454	0-141	159	159
150.40	22°43.0'	111°58.0'	I-11	0126	0140	488	0-136	41	41
150.50	22°21.0'	112°35.0'	I-10	2006	2021	489	0-131	45	45
150.60	22°05.0'	113°17.0'	I-10	1526	1540	465	0-136	17	17

Plankton Volumes, Cruise 5402, February 1954

Position			(1954)	Time (PST)		Vol. water strained	Depth of haul	Vol.per 1000 C.M.strained	
								Total	Sm.org.
Sta.	N.lat.	W.long.	Date	Start	End	C.M.	in meters	cc.	cc.
77.50	35°03.5'	120°52.0'	II-3	1746	1801	464	0-146	69	69
77.55	34°54.5'	121°13.0'	II-3	1522	1537	482	0-133	75	75
80.51	34°26.0'	120°33.5'	II-3	2221	2235	504	0-125	143	143
80.55	34°19.0'	120°48.0'	II-4	0126	0141	472	0-134	351	351
80.60	34°09.0'	121°09.0'	II-4	0336	0351	444	0-148	135	135
80.70	33°49.0'	121°50.0'	II-4	0911	0925	416	0-143	154	154
80.80	33°29.0'	122°32.0'	II-4	1311	1325	472	0-140	51	51
82.47	34°15.0'	119°58.0'	II-5	0851	0905	460	0-136	152	152
83.40	34°14.0'	119°22.0'	II-5	1434	1437	97	0-17	330	330
83.43	34°08.0'	119°34.0'	II-5	1311	1325	473	0-134	165	165
83.48	33°58.0'	119°55.0'	II-5	0546	0601	459	0-126	240	240
83.51	33°52.5'	120°08.5'	II-5	0356	0411	471	0-133	81	81
83.55	33°44.0'	120°24.5'	II-5	0056	0114	552	0-137	143	143
83.60	33°34.0'	120°45.0'	II-4	2234	2248	385	0-147	7376	104
85.39	34°00.5'	119°04.0'	II-5	1848	1856	262	0-79	80	80
85.40	33°57.0'	119°10.5'	II-5	1946	2000	495	0-131	65	65
85.45	33°46.5'	119°33.0'	II-6	0056	0111	519	0-129	256	256
85.50	33°36.5'	119°53.0'	II-6	1406	1421	419	0-124	124	124
85.55	33°26.5'	120°12.5	II-6	1826	1841	429	0-146	135	135
85.60	33°17.0'	120°33.5'	II-6	2056	2110	434	0-145	161	161
87.35	33°50.0'	118°37.0'	II-7	2141	2155	475	0-130	76	76
87.40	33°40.5'	118°58.5'	II-7	1906	1921	469	0-136	90	90
87.45	33°30.0'	119°19.0'	II-7	1541	1556	470	0-124	60	60
87.50	33°20.0'	119°39.0'	II-7	1328	1336	244	0-70	131	131
87.55	33°12.0'	120°03.0'	II-7	0246	0300	455	0-136	1547	141
87.60	33°00.0'	120°21.0'	II-7	0027	0042	477	0-128	304	304
90.28	33°28.5'	117°47.0'	II-8	0348	0355	220	0-55	146	146
90.30	33°24.5'	117°55.0'	II-8	0506	0521	478	0-131	159	84
90.37	33°11.0'	118°23.5'	II-9	1246	1300	504	0-125	113	113
90.45	32°54.5'	118°56.0'	II-9	1616	1631	458	0-139	175	100
90.55	32°35.0'	119°37.0'	II-9	2246	2300	450	0-142	803	113
90.60	32°25.0'	119°57.0'	II-10	0121	0136	490	0-124	394	394
90.70	32°05.0'	120°38.5'	II-10	0706	0721	430	0-141	154	154
90.80	31°45.0'	121°19.0'	II-10	1341	1355	482	0-133	95	95
93.27	32°57.0'	117°18.5'	II-11	1628	1636	283	0-58	35	35
93.30	32°52.0'	117°33.5'	II-11	1441	1456	486	0-138	29	29
93.40	32°30.0'	118°12.5'	II-11	0921	0935	489	0-129	22	22
93.50	32°13.0'	118°55.0'	II-11	0411	0426	483	0-125	1330	89
93.60	31°49.0'	119°34.0'	II-10	2226	2240	526	0-134	281	281
97.30	32°15.5'	117°10.0'	II-11	2038	2044	218	0-50	55	55
97.32	32°11.5'	117°17.5'	II-11	2146	2200	500	0-125	60	60
97.40	31°56.0'	117°50.0'	II-12	0211	0226	475	0-134	76	76
97.50	31°38.0'	118°32.0'	II-12	0641	0656	482	0-135	271	271
97.60	31°14.5'	119°12.0'	II-12	1141	1156	464	0-132	1424	237
100.29	31°42.0'	116°43.5'	II-13	2333	2340	221	0-73	163	163

Plankton Volumes, Cruise 5402, February 1954 (cont'd)

Sta.	Position N.lat.	W.long.	(1954) Date	Time (PST) Start	End	Vol. water strained C.M.	Depth of haul in meters	Vol.per 1000 C.M.strained Total cc.	Sm.org. cc.
100.30	31°40.5'	116°47.0'	II-13	2211	2226	525	0-139	99	99
100.40	31°21.5'	117°26.5'	II-13	1726	1741	510	0-134	20	20
100.50	30°57.0'	118°06.0'	II-13	1256	1310	464	0-137	108	108
100.60	30°39.0'	118°45.0'	II-13	0731	0746	463	0-145	380	380
100.70	30°20.0'	119°26.0'	II-13	0231	0246	445	0-141	225	225
100.80	30°01.0'	120°07.0'	II-12	2026	2040	498	0-130	253	253
103.30	31°06.0'	116°25.5'	II-15	1918	1926	273	0-62	117	117
103.35	30°56.0'	116°44.5'	II-15	1636	1651	419	0-153	1552	1552
103.40	30°46.0'	117°05.0'	II-15	1351	1406	442	0-156	362	362
103.45	30°37.0'	117°22.5'	II-15	1051	1105	458	0-140	1527	1527
103.50	30°27.5'	118°00.0'	II-15	0701	0716	454	0-141	181	181
103.60	30°07.0'	118°26.0'	II-15	0236	0250	451	0-148	120	120
107.32	30°25.0'	116°11.5'	II-14	0151	0206	480	0-134	62	62
107.35	30°21.0'	116°22.0'	II-14	0426	0441	493	0-126	487	487
107.40	30°10.0'	116°43.5'	II-14	0711	0726	426	0-148	61	61
107.45	30°00.0'	117°03.0'	II-14	0951	1005	456	0-135	44	44
107.50	29°50.5'	117°24.0'	II-14	1326	1340	455	0-145	114	114
107.60	29°32.0'	118°05.0'	II-14	1736	1751	451	0-141	115	115
110.33	29°51.0'	115°52.5'	II-13	2128	2136	263	0-89	152	152
110.35	29°46.5'	115°58.5'	II-13	1951	2006	527	0-118	209	110
110.40	29°42.0'	116°10.5'	II-13	1801	1816	470	0-128	162	162
110.45	29°27.0'	116°38.0'	II-13	1421	1436	446	0-138	76	76
110.50	29°15.0'	116°59.0'	II-13	1136	1151	424	0-143	38	38
110.60	29°04.0'	117°43.0'	II-13	0706	0721	452	0-142	195	195
113.30	29°21.0'	115°20.0'	II-12	0428	0435	206	0-58	107	107
113.35	29°09.5'	115°42.0'	II-12	0801	0815	484	0-127	66	66
113.40	29°01.0'	115°57.5'	II-12	1016	1031	475	0-138	63	63
113.45	28°52.0'	116°19.0'	II-12	1256	1310	416	0-151	53	53
113.50	28°47.0'	116°38.0'	II-12	1816	1830	432	0-145	46	46
113.60	28°23.0'	117°17.0'	II-12	2246	2301	475	0-136	93	93
117.26			Occupied. Sample lost						
117.30	28°47.5'	114°56.0'	II-11	0918	0926	240	0-68	42	42
117.35	28°37.0'	115°16.5'	II-11	0601	0616	466	0-129	39	39
117.40	28°28.0'	115°36.5'	II-11	0256	0311	448	0-126	223	223
117.45	28°19.5'	115°55.0'	II-10	2331	2346	458	0-127	70	70
117.50	28°08.0'	116°15.0'	II-10	2051	2105	428	0-137	154	154
117.55	27°57.5'	116°35.0'	II-10	1811	1826	456	0-128	79	79
117.60	27°46.0'	116°55.0'	II-10	1546	1601	451	0-135	31	31
120.25	28°22.5'	114°15.0'	II-8	1959	2004	171	0-35	70	70
120.30	28°12.5'	114°34.0'	II-8	2238	2245	259	0-60	85	85
120.35	28°03.0'	114°51.0'	II-9	0028	0035	282	0-57	42	42
120.37	27°59.0'	115°03.0'	II-9	0238	0245	260	0-52	54	54
120.40	27°56.0'	115°20.0'	II-9	0428	0436	262	0-63	358	358
120.42	27°49.0'	115°24.0'	II-9	0541	0556	443	0-138	81	81
120.45	27°42.5'	115°34.0'	II-9	0721	0736	443	0-130	122	122
120.50	27°32.5'	115°51.0'	II-9	1051	1106	440	0-136	73	73

Plankton Volumes, Cruise 5402, February 1954 (cont'd)

Sta.	Position N.lat.	W.long.	(1954) Date	Time(PST) Start	End	Vol. water strained C.M.	Depth of haul in meters	Vol.per 1000 C.M.strained Total cc.	Sm.org. cc.
120.55	27°19.5'	116°14.0'	II-9	1341	1356	454	0-138	79	79
120.60	27°10.0'	116°31.0'	II-9	1611	1626	504	0-119	36	36
120.70	26°52.0'	117°10.5'	II-10	0031	0045	464	0-127	91	91
120.80	26°35.0'	118°03.0'	II-10	0451	0506	449	0-137	151	151
123.37	27°23.8'	114°41.4'	II-8	0148	0156	259	0-60	370	370
123.40	27°17.4'	114°52.8'	II-7	2351	0006	482	0-115	166	166
123.42	27°13.0'	115°01.4'	II-7	2211	2225	450	0-139	222	222
123.45	27°08.5'	115°11.0'	II-7	2036	2051	473	0-143	148	148
123.50	27°01.5'	115°29.5'	II-7	1756	1811	542	0-118	207	207
127.34	26°55.0'	114°06.5'	II-7	0333	0341	291	0-58	55	55
127.40	26°41.5'	114°30.5'	II-7	0726	0740	423	0-148	71	71
127.45	26°33.5'	114°48.5'	II-7	0956	1011	446	0-136	72	72
127.50	26°21.5'	115°11.5'	II-7	1231	1246	513	0-124	94	94
130.30	26°30.0'	113°27.8'	II-6	2318	2325	245	0-68	65	65
130.35	26°28.0'	113°47.8'	II-6	2032	2042	300	0-94	80	80
130.40	26°19.5'	114°16.0'	II-6	1706	1720	469	0-142	55	55
130.45	25°56.5'	114°22.0'	II-6	1306	1320	539	0-117	52	52
130.50	25°46.5'	114°44.0'	II-6	1056	1110	470	0-137	68	68
130.55	25°28.0'	114°58.0'	II-6	0741	0755	458	0-132	183	183
130.60	25°33.0'	115°29.0'	II-6	0446	0501	569	0-107	91	91
133.25	26°05.0'	112°48.5'	II-5	0103	0110	273	0-61	48	48
133.30	25°53.0'	113°11.0'	II-5	0428	0440	535	0-63	2698	107
133.35	25°41.5'	113°29.5'	II-5	0711	0726	503	0-124	40	40
133.40	25°29.0'	113°49.0'	II-5	1001	1015	514	0-124	117	117
137.23	25°37.5'	112°20.5'	II-4	1638	1646	306	0-60	72	72
137.30	25°25.0'	112°44.0'	II-4	2001	2015	485	0-133	54	54

Plankton Volumes, Cruise 5403, March 1954

77.50	35°03.5'	120°52.5'	III-9	1021	1036	491	0-140	77	77
77.55	34°54.5'	121°10.5'	III-9	1306	1320	491	0-140	65	65
80.51	34°27.5'	120°32.5'	III-9	0618	0626	281	0-66	463	463
80.55	34°20.0'	120°48.5'	III-9	0416	0431	505	0-140	558	558
80.60	34°10.0'	121°09.0'	III-9	0121	0135	491	0-141	546	546
80.70	33°49.0'	121°51.0'	III-8	2141	2156	496	0-133	545	545
80.80	33°29.0'	122°32.0'	III-8	1641	1656	524	0-136	183	183
80.90	33°09.5'	123°12.0'	III-8	1256	1310	640	0-137	288	288
82.47	34°16.0'	119°58.0'	III-7	1316	1330	542	0-126	173	173
83.40	34°14.0'	119°22.0'	III-7	0819	0822	119	0-18	117	117
83.43	34°09.0'	119°35.0'	III-7	1016	1030	537	0-133	60	60
83.48	33°58.5'	119°55.5'	III-7	1726	1740	516	0-139	97	97
83.51	33°52.0'	120°08.5'	III-7	1936	1950	468	0-153	235	235
83.55	33°44.0'	120°24.5'	III-7	2131	2145	564	0-141	606	181

Plankton Volumes, Cruise 5403, March 1954 (cont'd)

Sta.	Position N.lat.	Position W.long.	(1954) Date	Time (PST) Start	Time (PST) End	Vol. water strained C.M.	Depth of haul in meters	Vol.per 1000 C.M.strained Total cc.	Vol.per 1000 C.M.strained Sm.org. cc.
83.60	33°34.0'	120°46.0'	III-8	0101	0115	513	0-142	183	183
85.39	34°00.0'	119°04.0'	III-7	0556	0611	562	0-134	103	103
85.40	33°57.0'	119°10.5'	III-7	0401	0416	528	0-135	53	53
85.45	33°48.0'	119°31.5'	III-7	0146	0200	566	0-132	92	92
85.50	33°37.0'	119°52.5'	III-6	2206	2220	455	0-151	226	226
85.55	33°30.0'	120°15.0'	III-6	1936	1951	499	0-160	694	192
85.60	33°18.5'	120°39.0'	III-6	1546	1601	495	0-157	517	42
87.35	33°49.5'	118°38.5'	III-5	2320	2336	610	0-137	158	158
87.40	33°40.0'	118°58.5'	III-6	0220	0234	541	0-141	65	65
87.45	33°30.0'	119°19.0'	III-6	0501	0516	458	0-156	157	157
87.50	33°20.0'	119°39.0'	III-6	0748	0756	249	0-71	587	587
87.55	33°10.0'	120°00.5'	III-6	1016	1031	501	0-144	166	166
87.60	33°02.5'	120°24.0'	III-6	1330	1344	485	0-164	470	470
90.28	33°28.5'	117°47.0'	III-10	0547	0557	350	0-89	46	46
90.30	33°24.5'	117°55.0'	III-10	0646	0701	508	0-143	130	130
90.37	33°11.0'	118°23.5'	III-10	1036	1051	523	0-150	42	42
90.45	32°56.5'	118°54.5'	III-10	1406	1420	531	0-141	64	64
90.55	32°35.0'	119°36.5'	III-10	2035	2051	494	0-146	452	452
90.60	32°25.0'	119°57.5'	III-10	2316	2331	589	0-135	200	200
90.70	32°04.0'	120°40.0'	III-11	0540	0556	591	0-138	183	183
90.80			Not occupied						
90.90			Not occupied						
93.27	32°56.0'	117°19.0'	III-12	0837	0848	392	0-97	66	66
93.30	32°50.0'	117°31.5'	III-12	0651	0706	480	0-148	42	42
93.40	32°26.5'	118°11.0'	III-12	0106	0120	545	0-142	64	64
93.50			Not occupied						
93.60			Not occupied						
93.70	31°29.0'	120°19.5'	III-11	1116	1130	622	0-122	80	80
97.30	32°15.4'	117°08.8'	III-18	1829	1834	114	0-28	158	158
97.32	32°11.5'	117°17.0'	III-18	1711	1725	634	0-97	77	77
97.40	31°57.8'	117°51.0'	III-18	1246	1301	519	0-130	42	42
97.50	31°37.0'	118°30.1'	III-18	0834	0848	496	0-144	48	48
97.60	31°16.5'	119°09.2'	III-18	0351	0405	524	0-122	170	170
97.70	30°55.0'	119°50.5'	III-17	2316	2331	429	0-147	103	103
100.29	31°42.1'	116°44.5'	III-16	0553	0559	405	0-20	49	49
100.30	31°40.5'	116°46.4'	III-16	0642	0657	562	0-116	46	46
100.35	31°31.8'	117°04.3'	III-16	0844	0858	500	0-138	44	44
100.40	31°19.7'	117°29.2'	III-16	1106	1120	538	0-130	76	76
100.45	31°11.8'	117°46.0'	III-16	1304	1319	505	0-133	47	47
100.50	31°03.4'	118°02.8'	III-16	1511	1526	514	0-125	136	136
100.55	30°52.8'	118°26.0'	III-16	1851	1906	580	0-111	188	174
100.60	30°40.9'	118°48.0'	III-16	2126	2141	502	0-126	285	285
100.70	30°24.3'	119°24.7'	III-17	0151	0206	544	0-122	75	66
100.80	30°01.0'	120°07.8'	III-17	0804	0818	506	0-129	99	99
100.90	29°39.1'	120°46.8'	III-17	1336	1351	537	0-125	30	30

Plankton Volumes, Cruise 5403, March 1954 (cont'd)

Position			(1954)	Time (PST)		Vol. water strained	Depth of haul	Vol.per 1000 C.M.strained	
								Total	Sm.org.
Sta.	N.lat.	W.long.	Date	Start	End	C.M.	in meters	cc.	cc.
103.30	31°06.8'	116°27.5'	III-16	0114	0120	227	0-52	48	48
103.35	30°59.3'	116°46.6'	III-15	2256	2310	517	0-120	50	50
103.40	30°49.1'	117°06.8'	III-15	1940	1954	502	0-129	58	58
103.45	30°39.0'	117°25.9'	III-15	1731	1745	482	0-142	139	139
103.50	30°26.2'	117°48.0'	III-15	1514	1528	538	0-131	47	47
103.55	30°15.9'	118°08.3'	III-15	1251	1306	486	0-137	53	53
103.60	30°09.8'	118°23.2'	III-15	1016	1030	513	0-132	43	43
107.32	30°25.5'	116°10.5'	III-14	1456	1510	610	0-109	26	26
107.35	30°19.4'	116°23.0'	III-14	1555	1610	602	0-100	55	55
107.40	30°09.8'	116°43.7'	III-14	2014	2028	489	0-139	59	59
107.45	30°00.0'	117°04.0'	III-14	2236	2251	523	0-126	86	86
107.50	29°50.0'	117°24.2'	III-15	0106	0121	522	0-127	90	73
107.55	29°41.0'	117°44.0'	III-15	0421	0436	605	0-100	109	109
107.60	29°28.9'	118°05.6'	III-15	0606	0621	523	0-124	71	71
110.33	29°50.7'	115°52.6'	III-14	1008	1016	270	0-61	44	44
110.35	29°43.1'	115°59.7'	III-14	0829	0843	481	0-130	33	33
110.40	29°30.0'	116°25.7'	III-14	0341	0356	571	0-114	54	54
110.45	29°20.0'	116°43.0'	III-14	0106	0120	467	0-141	32	32
110.50	29°10.5'	117°01.2'	III-13	2241	2255	461	0-149	33	33
110.55	29°00.1'	117°19.0'	III-13	2041	2055	462	0-146	56	56
110.60	28°56.0'	117°39.2'	III-13	1646	1701	687	0-84	44	44
110.70	28°25.6'	118°18.2'	III-13	1136	1151	477	0-130	36	36
110.80	28°14.8'	118°45.5'	III-13	0626	0640	526	0-123	19	19
113.30	29°22.5'	115°17.5'	III-12	0203	0210	227	0-55	554	554
113.32	29°17.0'	115°28.7'	III-12	0323	0330	271	0-73	668	668
113.35	29°11.1'	115°39.7'	III-12	0446	0500	657	0-93	32	32
113.37	29°05.7'	115°47.9'	III-12	0801	0815	494	0-126	22	22
113.40	29°00.9'	115°57.7'	III-12	0950	1004	452	0-143	22	22
113.42	28°55.9'	116°07.5'	III-12	1110	1124	448	0-127	18	18
113.45	28°50.9'	116°17.3'	III-12	1220	1235	474	0-135	21	21
113.47	28°47.6'	116°28.2'	III-12	1356	1411	491	0-138	16	16
113.50	28°44.9'	116°42.9'	III-12	1541	1556	571	0-111	33	33
113.55	28°35.3'	116°58.5'	III-12	1856	1911	439	0-147	41	41
113.60	28°24.9'	117°18.2'	III-12	2141	2155	436	0-151	78	78
117.26	28°57.0'	114°40.7'	III-11	1859	1905	269	0-33	268	268
117.28	28°51.8'	114°47.2'	III-11	1759	1805	274	0-37	33	33
117.30	28°47.0'	114°55.2'	III-11	1608	1615	262	0-55	99	99
117.32	28°42.5'	115°05.7'	III-11	1435	1443	245	0-76	12	12
117.35	28°37.8'	115°16.0'	III-11	1301	1316	561	0-130	34	34
117.37	28°32.8'	115°26.2'	III-11	1118	1133	562	0-116	20	20
117.40	28°27.6'	115°35.8'	III-11	0856	0910	613	0-102	39	39
117.42	28°23.0'	115°47.7'	III-11	0716	0731	538	0-127	19	19
117.45	28°22.4'	115°57.4'	III-11	0526	0540	560	0-118	48	48
117.47	28°16.1'	116°07.6'	III-11	0326	0341	493	0-138	57	57
117.50	28°11.2'	116°16.6'	III-11	0156	0211	546	0-128	40	40

Plankton Volumes, Cruise 5403, March 1954 (cont'd)

Sta.	Position N.lat.	Position W.long.	(1954) Date	Time (PST) Start	Time (PST) End	Vol. water strained C.M.	Depth of haul in meters	Vol.per 1000 C.M.strained Total cc.	Vol.per 1000 C.M.strained Sm.org. cc.
117.55	27°59.0'	116°35.3'	III-10	2116	2131	540	0-148	46	46
117.60	27°47.5'	116°54.0'	III-10	1946	2000	546	0-120	44	44
120.25	28°22.7'	114°14.9'	III-8	1753	1759	275	0-30	36	36
120.27			Occupied. Sample not quantitative						
120.30	28°11.9'	114°34.5'	III-8	2045	2053	304	0-60	43	43
120.32	28°07.2'	114°43.7'	III-8	2153	2200	339	0-52	21	21
120.35	28°03.2'	114°53.3'	III-8	2259	2304	242	0-34	29	29
130.37	27°59.7'	115°04.8'	III-9	0124	0129	213	0-43	23	23
130.40	27°56.2'	115°15.2'	III-9	0241	0246	164	0-40	67	67
130.42	27°50.3'	115°29.3'	III-9	0350	0404	477	0-95	67	67
120.45	27°40.7'	115°38.5'	III-9	0526	0541	506	0-132	36	36
120.47	27°35.0'	115°47.8'	III-9	0701	0716	497	0-141	24	24
120.50	27°31.5'	115°51.8'	III-9	0756	0810	499	0-135	26	26
120.55	27°22.6'	116°10.6'	III-9	1136	1151	519	0-131	44	44
120.60	27°13.0'	116°31.5'	III-9	1408	1422	546	0-123	35	35
120.70	26°58.0'	117°16.9'	III-9	1826	1840	531	0-129	40	40
120.80	26°32.5'	117°48.5'	III-9	2340	2355	490	0-141	39	39
120.90	26°13.0'	118°27.5'	III-10	0401	0416	601	0-105	88	43
123.37	27°24.0'	114°39.7'	III-8	0828	0834	215	0-53	182	182
123.40	27°21.3'	114°53.7'	III-8	0551	0606	494	0-141	85	85
123.42	27°09.1'	115°12.6'	III-8	0311	0326	501	0-137	52	52
123.45	27°05.0'	115°20.0'	III-8	0153	0208	525	0-134	38	38
123.47	27°00.7'	115°28.3'	III-8	0014	0029	484	0-136	68	68
123.50	26°56.6'	115°36.4'	III-7	2256	2310	483	0-145	131	131
123.55	26°48.4'	115°51.7'	III-7	2011	2026	555	0-124	81	81
123.60	26°38.3'	116°09.4'	III-7	1656	1710	537	0-124	60	60
127.34	26°55.1'	114°06.6'	III-6	2139	2144	158	0-47	89	89
127.37	26°48.4'	114°17.7'	III-6	2321	2336	485	0-138	70	70
127.40	26°41.8'	114°29.7'	III-7	0104	0119	519	0-138	66	66
127.42	26°35.2'	114°39.9'	III-7	0224	0239	509	0-136	45	45
127.45	26°28.5'	114°51.0'	III-7	0400	0415	483	0-139	41	27
127.47	26°28.8'	115°02.3'	III-7	0537	0552	483	0-143	27	27
127.50	26°18.5'	115°13.0'	III-7	0706	0721	466	0-144	34	34
127.55	26°12.5'	115°27.2'	III-7	0956	1010	468	0-137	36	36
127.60	26°04.2'	115°45.0'	III-7	1225	1236	504	0-134	38	38
130.30	26°29.7'	113°28.8'	III-6	1659	1704	228	0-43	140	140
130.35	26°19.0'	113°48.5'	III-6	1356	1410	538	0-137	56	56
130.40	26°06.8'	114°08.9'	III-6	1026	1041	490	0-139	67	67
130.45	25°59.7'	114°27.2'	III-6	0806	0820	525	0-131	65	65
130.50	25°45.5'	114°50.5'	III-6	0511	0526	513	0-130	58	58
130.55	25°34.9'	115°08.9'	III-6	0256	0311	584	0-117	135	135
130.60	25°04.0'	115°26.9'	III-5	2346	0001	548	0-125	66	66
133.25	26°03.2'	112°54.9'	III-5	0539	0550	302	0-98	132	132
133.30	25°55.7'	113°07.8'	III-5	0816	0830	522	0-118	59	59
133.35	25°44.2'	113°26.7'	III-5	1026	1040	517	0-142	48	48

Plankton Volumes, Cruise 5403, March 1954 (cont'd)

Position			(1954)	Time (PST)		Vol. water strained	Depth of haul	Vol. per 1000 C.M. strained	
								Total	Sm. org.
Sta.	N.lat.	W.long.	Date	Start	End	C.M.	in meters	cc.	cc.
133.40	25°34.8'	113°45.5'	III-5	1231	1245	517	0-140	19	19
133.45	25°24.7'	114°04.7'	III-5	1450	1504	479	0-142	40	40
133.50	25°14.9'	114°24.5'	III-5	1811	1826	525	0-133	44	44
137.23	25°34.3'	112°18.7'	III-5	0114	0120	240	0-54	213	213
137.30	25°20.0'	112°45.4'	III-4	2144	2159	520	0-144	102	102
137.35	25°12.1'	113°05.7'	III-4	1916	1931	513	0-141	80	80
137.40	25°01.3'	113°26.3'	III-4	1656	1711	505	0-137	55	16
137.45	24°50.0'	113°44.8'	III-4	1336	1351	541	0-138	44	44
137.50	24°40.0'	114°02.0'	III-4	1141	1156	499	0-139	40	40
			Plankton Volumes, Cruise 5404, April 1954						
60.55	37°44.7'	123°13.6'	IV-11	1531	1546	498	0-138	189	189
60.60	37°42.0'	123°42.2'	IV-11	1156	1210	559	0-123	84	84
60.70	37°19.8'	124°24.6'	IV-11	0751	0806	595	0-108	126	126
60.80	36°57.8'	125°04.0'	IV-11	0321	0336	(517)	0-128	68	68
60.90	36°44.2'	125°31.3'	IV-11	0021	0036	(529)	0-120	134	134
63.52	37°19.0'	122°36.2'	IV-13	1123	1130	289	0-56	170	170
63.55	37°14.0'	122°49.5'	IV-13	1236	1251	502	0-133	132	132
67.50	36°49.0'	122°04.6'	IV-13	1946	1959	619	0-68	528	528
67.55	36°37.3'	122°27.3'	IV-13	1726	1740	530	0-126	194	194
70.51			Occupied. No biological data taken						
70.55	36°05.8'	121°56.9'	IV-9	1131	1146	601	0-114	165	165
70.60	35°50.3'	122°22.0'	IV-9	1441	1456	484	0-136	385	174
70.70	35°33.3'	123°13.9'	IV-9	1926	1941	571	0-105	294	270
70.80			Occupied. No biological data taken						
70.90	34°56.5'	124°32.3'	IV-10	0316	0331	556	0-127	252	241
73.50	35°37.2'	121°18.6'	IV-14	0401	0416	496	0-140	81	81
73.60	35°18.9'	121°58.1'	IV-14	0746	0800	560	0-102	209	209
77.50	35°03.8'	120°52.2'	IV-14	2103	2110	290	0-64	380	380
77.55	34°54.8'	121°13.6'	IV-14	1736	1751	467	0-129	2019	2019
77.65	34°34.0'	121°55.0'	IV-14	1321	1336	502	0-132	98	98
80.51	34°26.5'	120°32.5'	IV-15	0103	0111	300	0-58	609	609
80.55	34°19.0'	120°48.0'	IV-15	0240	0255	508	0-114	181	181
80.60	34°09.8'	121°11.6	IV-15	0601	0616	497	0-121	161	161
80.70	33°48.4'	121°50.2'	IV-15	0936	0950	468	0-137	193	178
80.80	33°29.8'	122°32.8'	IV-15	1426	1441	509	0-124	399	116
80.90	33°10.1'	123°10.3'	IV-15	1756	1810	504	0-125	105	105
82.47	34°15.0'	119°58.0'	IV-16	2126	2140	480	0-140	196	196
83.40	34°14.1'	119°21.9'	IV-17	0224	0227	150	0-11	481	481
83.43	34°08.0'	119°34.0'	IV-17	0011	0026	554	0-118	235	235
83.48	33°58.3'	119°55.0'	IV-16	1927	1937	363	0-78	201	201
83.51	33°52.3'	120°08.6'	IV-16	1707	1718	408	0-102	206	206
83.55	33°44.0'	120°24.5'	IV-16	1521	1536	497	0-126	211	211
83.60	33°42.3'	120°51.6'	IV-16	1211	1225	468	0-136	248	226

Plankton Volumes, Cruise 5404, April 1954 (cont'd)

Sta.	Position N.lat.	W.long.	(1954) Date	Time (PST) Start	End	Vol. water strained C.M.	Depth of haul in meters	Vol.per 1000 C.M.strained Total cc.	Sm.org. cc.
83.70	33°24.0'	121°23.1'	IV-16	0901	0916	548	0-114	206	194
83.80	32°58.0'	122°08.2'	IV-16	0251	0306	480	0-138	77	77
83.90	32°33.6'	122°50.0'	IV-15	2241	2256	526	0-119	65	65
85.39	34°00.0'	119°04.6'	IV-8	0441	0456	515	0-107	188	188
85.40	33°57.5'	119°11.8'	IV-8	0336	0351	547	0-113	227	227
85.45	33°47.0'	119°31.2'	IV-7	2236	2251	450	0-146	71	71
85.50	33°37.0'	119°50.5'	IV-7	2016	2030	557	0-117	502	144
85.55	33°27.2'	120°06.6'	IV-7	1612	1626	516	0-131	219	54
85.60	33°17.0'	120°33.5'	IV-7	1326	1341	519	0-136	287	196
87.35	33°50.3'	118°37.2'	IV-17	0621	0635	499	0-128	786	339
87.40	33°40.0'	118°58.3'	IV-17	0840	0854	470	0-133	111	81
87.45	33°30.3'	119°19.0'	IV-17	1134	1149	488	0-136	254	254
87.50	33°21.3'	119°41.1'	IV-17	1400	1408	289	0-59	221	152
87.55	33°10.0'	120°00.5'	IV-17	1621	1635	460	0-143	233	217
87.60	32°58.8'	120°20.8'	IV-17	1836	1851	465	0-134	480	334
87.70	32°36.3'	121°01.5'	IV-17	2341	2356	513	0-125	195	195
87.80	32°14.9'	121°41.8'	IV-18	0341	0356	494	0-129	109	109
87.90	31°53.0'	122°22.5'	IV-18	0831	0846	513	0-123	27	27
90.28	33°28.5'	117°46.7'	IV-19	1951	2005	508	0-118	372	224
90.30	33°24.6'	117°53.7'	IV-19	1839	1854	533	0-109	512	512
90.37	33°11.4'	118°24.2'	IV-19	1456	1510	465	0-138	75	75
90.45	32°53.5'	118°52.7'	IV-19	1126	1140	600	0-93	195	77
90.55	32°31.7'	119°30.5'	IV-19	0601	0616	475	0-132	158	158
90.60	32°21.9'	119°52.2'	IV-19	0326	0340	525	0-123	139	139
90.70	32°02.9'	120°34.0'	IV-18	2113	2127	479	0-132	138	138
90.80	31°43.2'	121°16.3'	IV-18	1721	1735	476	0-138	78	65
90.90	31°23.3'	122°00.0'	IV-18	1214	1229	468	0-134	90	90
93.27	32°56.0'	117°19.0'	IV-9	1957	2007	360	0-88	350	350
93.30	32°50.0'	117°31.5'	IV-9	2312	2328	534	0-134	124	124
93.35	32°39.3'	117°51.7'	IV-10	0156	0210	482	0-140	174	174
93.40	32°30.0'	118°12.5'	IV-10	0541	0555	514	0-147	126	126
93.45	32°22.0'	118°30.2'	IV-10	0856	0911	496	0-142	85	67
93.50	32°10.0'	118°53.0'	IV-10	1411	1426	480	0-148	38	38
93.55	31°59.0'	119°14.5'	IV-10	1711	1725	395	0-156	63	63
93.60	31°48.0'	119°35.5'	IV-10	2056	2110	457	0-153	269	191
93.70	31°25.0'	120°20.0'	IV-11	0411	0425	428	0-152	112	84
93.80	31°02.0'	121°05.0'	IV-11	0956	1010	485	0-144	54	54
93.90	30°47.0'	121°35.0'	IV-11	1506	1520	450	0-144	47	47
97.30	32°15.7'	117°09.0'	IV-13	0848	0854	201	0-38	433	433
97.32	Occupied. Sample spoiled								
97.40	31°55.0'	117°49.0'	IV-13	0311	0325	482	0-141	91	91
97.45	31°45.2'	118°08.5'	IV-12	2326	2340	484	0-140	62	62
97.50	31°35.0'	118°29.2'	IV-12	2011	2026	441	0-144	68	68
97.55	31°25.2'	118°50.0'	IV-12	1711	1726	487	0-144	312	127
97.60	31°16.2'	119°07.5'	IV-12	1431	1446	463	0-137	467	130

Plankton Volumes, Cruise 5404, April 1954 (cont'd)

Position				Time (PST)		Vol. water strained	Depth of haul	Vol. per 1000 C.M. strained	
			(1954)					Total	Sm. org.
Sta.	N. lat.	W. long.	Date	Start	End	C.M.	in meters	cc.	cc.
97.70	30°56.0'	119°48.5'	IV-12	0806	0821	501	0-144	283	98
97.80	30°35.5'	120°30.0'	IV-12	0226	0240	480	0-149	129	129
97.90	30°15.0'	121°10.0'	IV-11	1941	1956	505	0-143	40	40
100.29	31°42.3'	116°43.5'	IV-14	1819	1822	164	0-35	244	244
100.30	31°40.4'	116°46.3'	IV-14	1906	1920	503	0-134	52	52
100.35	31°31.0'	117°06.5'	IV-14	2201	2215	484	0-140	157	157
100.40	31°19.5'	117°25.8'	IV-15	0056	0110	485	0-137	66	66
100.45	31°09.0'	117°45.0'	IV-15	0346	0401	503	0-140	81	50
100.50	30°58.5'	118°03.8'	IV-15	0831	0845	463	0-140	35	35
100.55	30°49.0'	118°22.1'	IV-15	1131	1145	475	0-136	38	38
100.60	30°38.5'	118°42.0'	IV-15	1426	1440	460	0-138	50	50
100.70	30°20.5'	119°26.5'	IV-15	2141	2154	422	0-123	135	135
100.80	30°04.0'	120°03.5'	IV-16	0241	0255	436	0-140	71	71
100.90	29°47.0'	120°40.0'	IV-16	0941	0956	468	0-136	43	43
100.100	29°28.0'	121°22.5'	IV-16	1526	1541	461	0-137	22	22
103.30	31°05.2'	116°25.1'	IV-19	1124	1129	174	0-41	231	231
103.35	30°55.2'	116°45.2'	IV-19	1356	1411	443	0-140	45	45
103.40	30°45.0'	117°17.5'	IV-19	1726	1741	465	0-152	43	43
103.45	30°35.5'	117°25.0'	IV-19	2006	2020	475	0-139	63	63
103.50	30°25.5'	117°45.0'	IV-19	2246	2300	473	0-144	53	53
103.55	30°15.5'	118°05.0'	IV-20	0146	0200	402	0-156	72	72
103.60	30°06.0'	118°25.0'	IV-20	0541	0555	496	0-146	60	60
103.70	29°44.0'	119°02.8'	IV-17	1041	1056	475	0-143	29	29
103.80	29°25.0'	119°43.0'	IV-17	0431	0444	369	0-119	46	46
103.90	Occupied. Sample not quantitative								
107.32	30°21.8'	116°11.0'	IV-19	0421	0435	427	0-134	145	145
107.35	30°15.0'	116°25.4'	IV-19	0151	0205	422	0-154	69	55
107.40	30°07.0'	116°44.8'	IV-18	2206	2220	411	0-151	32	32
107.45	29°59.0'	117°04.5'	IV-18	1905	1921	449	0-146	60	60
107.50	29°51.3'	117°24.2'	IV-18	1611	1626	404	0-147	62	62
107.55	29°43.5'	117°42.5'	IV-18	1211	1226	424	0-146	42	42
107.60	29°32.5'	118°02.5'	IV-17	0856	0910	424	0-149	80	80
107.70	29°05.0'	118°43.0'	IV-17	2216	2230	432	0-147	56	56
107.80	28°52.0'	119°20.0'	IV-17	1646	1700	461	0-136	35	35
110.33	29°48.5'	115°52.8'	IV-28	0437	0449	488	0-97	61	61
110.35	29°45.8'	116°00.0'	IV-28	0611	0626	434	0-138	37	37
110.40	29°33.8'	116°17.5'	IV-28	0816	0830	443	0-139	52	52
110.45	29°27.7'	116°33.5'	IV-28	1211	1226	485	0-140	21	21
110.50	29°16.3'	117°00.0'	IV-28	1451	1506	480	0-142	38	38
110.55	29°07.7'	117°25.5'	IV-28	1706	1720	470	0-143	51	51
110.60	28°57.8'	117°47.0'	IV-28	2006	2020	442	0-149	38	38
110.70	28°36.2'	118°18.0'	IV-28	2341	2356	537	0-129	39	39
110.80	28°15.7'	118°52.8'	IV-29	0426	0441	466	0-149	60	60
110.90	27°54.5'	119°27.0'	IV-29	0846	0900	465	0-132	37	37
113.30	29°24.3'	115°18.9'	IV-30	1439	1444	125	0-50	466	466

Plankton Volumes, Cruise 5404, April 1954 (cont'd)

Position				Time (PST)		Vol. water strained	Depth of haul	Vol.per 1000 C.M.strained	
			(1954)					Total	Sm.org.
Sta.	N.lat.	W.long.	Date	Start	End	C.M.	in meters	cc.	cc.
113.32	29°19.2'	115°29.4'	IV-30	1318	1327	299	0-82	60	60
113.35	29°13.3'	115°41.8'	IV-30	1136	1151	519	0-144	35	35
113.37	29°08.5'	115°51.7'	IV-30	0921	0936	443	0-148	27	27
113.40	29°04.0'	116°01.3'	IV-30	0801	0815	436	0-152	25	25
113.42	28°59.4'	116°10.9'	IV-30	0646	0700	425	0-151	28	28
113.45	28°56.3'	116°17.5'	IV-30	0541	0556	460	0-141	26	26
113.47	28°51.3'	116°26.9'	IV-30	0416	0430	483	0-141	54	54
113.50	28°45.3'	116°37.4'	IV-30	0256	0310	525	0-120	65	65
113.55	28°34.1'	116°56.7'	IV-29	2346	0001	454	0-144	46	46
113.60	28°23.2'	117°16.9'	IV-29	2131	2146	438	0-151	64	64
113.70	28°02.2'	117°55.5'	IV-29	1736	1750	437	0-156	37	37
117.26	28°55.5'	114°42.0'	IV-16	0343	0349	192	0-55	573	573
117.28	28°52.0'	114°48.5'	IV-16	0503	0511	241	0-65	282	282
117.30	28°48.0'	114°56.5'	IV-16	0628	0637	292	0-76	325	325
117.32	28°42.0'	115°05.0'	IV-16	0822	0833	347	0-110	170	170
117.35	28°36.5'	115°15.0'	IV-16	1026	1040	433	0-142	65	65
117.37	28°32.0'	115°25.5'	IV-16	1221	1236	468	0-130	81	81
117.40	28°26.5'	115°36.0'	IV-16	1402	1417	467	0-136	64	64
117.42	28°24.0'	115°46.5'	IV-16	1641	1656	479	0-134	27	27
117.45	28°19.0'	115°56.0'	IV-16	1811	1826	487	0-132	70	70
117.47	28°14.0'	116°06.0'	IV-16	1956	2010	473	0-135	95	95
117.50	28°08.5'	116°15.5'	IV-16	2141	2155	481	0-135	91	91
117.55	27°57.0'	116°35.0'	IV-17	0041	0055	456	0-141	75	75
117.60	27°46.0'	116°54.0'	IV-17	0348	0403	387	0-137	34	34
117.70	27°24.5'	117°32.0'	IV-17	0956	1010	459	0-139	703	50
120.25	28°24.5'	114°16.0'	IV-15	2218	2224	210	0-55	315	315
120.27	28°18.0'	114°24.0'	IV-15	2053	2100	215	0-71	503	503
120.30	28°13.0'	114°34.0'	IV-15	1908	1916	138	0-75	405	405
120.32	28°08.0'	114°44.5'	IV-15	1658	1705	237	0-64	190	190
120.35	28°03.0'	114°54.0'	IV-15	1510	1518	251	0-72	367	367
120.37	27°58.5'	115°03.5'	IV-15	1354	1359	126	0-39	779	779
120.40	27°58.0'	115°16.5'	IV-15	1204	1209	147	0-35	564	564
120.42	27°47.0'	115°23.5'	IV-15	0946	1000	348	0-130	253	253
120.45	27°39.0'	115°30.0'	IV-15	0801	0815	346	0-135	321	321
120.47	27°35.0'	115°40.0'	IV-15	0511	0526	396	0-128	394	394
120.50	27°31.0'	115°52.0'	IV-15	0226	0240	360	0-135	384	384
120.55	27°22.0'	116°11.0'	IV-14	2346	0001	420	0-126	67	67
120.60	27°13.0'	116°32.0'	IV-14	2046	2100	408	0-135	59	59
120.70	26°52.0'	117°11.0'	IV-14	1520	1535	421	0-125	57	57
123.37	27°24.0'	114°40.0'	IV-13	1719	1724	176	0-53	899	899
123.40	27°18.0'	114°51.5'	IV-13	1856	1911	381	0-140	452	452
123.42	27°13.0'	115°01.0'	IV-13	2116	2130	418	0-132	146	146
123.45	27°08.0'	115°10.5'	IV-13	2301	2315	380	0-131	369	369
123.47	27°03.3'	115°20.2'	IV-14	0056	0110	353	0-136	198	198
123.50	26°58.0'	115°30.5'	IV-14	0246	0300	380	0-137	149	149
123.55	26°48.0'	115°46.0'	IV-14	0524	0541	384	0-137	70	70

Plankton Volumes, Cruise 5404, April 1954 (cont'd)

Position			(1954)	Time (PST)		Vol. water strained	Depth of haul	Vol. per 1000 C.M. strained	
								Total	Sm. org.
Sta.	N. lat.	W. long.	Date	Start	End	C.M.	in meters	cc.	cc.
123.60	26°38.0'	116°09.0'	IV-14	0806	0820	427	0-120	87	87
127.34	26°54.0'	114°08.0'	IV-12	2053	2102	248	0-70	563	563
127.37	26°49.5'	114°17.3'	IV-12	1901	1916	357	0-144	205	205
127.40	26°44.5'	114°28.0'	IV-12	1711	1725	377	0-140	154	154
127.42	26°39.0'	114°39.5'	IV-12	1521	1536	341	0-144	296	296
127.45	26°34.0'	114°49.0'	IV-12	1346	1401	387	0-132	163	163
127.47	26°23.0'	115°00.0'	IV-12	1131	1145	406	0-132	52	52
127.50	26°24.0'	115°07.0'	IV-12	0830	0844	441	0-125	36	36
127.55	26°13.5'	115°27.0'	IV-12	0531	0546	291	0-138	89	89
127.60	26°04.0'	115°46.0'	IV-12	0221	0236	404	0-137	89	89
130.30	26°29.0'	113°30.5'	IV-11	0238	0246	215	0-69	847	847
130.35	26°19.0'	113°48.5'	IV-11	0526	0541	380	0-143	103	103
130.40	26°09.0'	114°06.0'	IV-11	0831	0845	435	0-122	55	55
130.45	25°54.5'	114°27.5'	IV-11	1206	1220	412	0-130	73	73
130.50	25°48.5'	114°46.5'	IV-11	1456	1510	419	0-128	64	64
130.55	25°37.0'	115°08.0'	IV-11	1736	1751	395	0-138	172	172
130.60	25°29.0'	115°24.0'	IV-11	2016	2030	380	0-141	108	108
133.25	26°06.0'	112°50.5'	IV-10	2113	2121	252	0-71	940	940
133.30	25°56.0'	113°08.5'	IV-10	1806	1820	449	0-120	210	210
133.35	25°46.0'	113°27.5'	IV-10	1456	1510	432	0-130	120	120
133.40	25°35.5'	113°46.0'	IV-10	1201	1216	434	0-131	23	23
133.45	25°25.0'	114°05.0'	IV-10	0916	0930	462	0-129	30	30
133.50	25°14.5'	114°24.0'	IV-10	0551	0606	433	0-126	62	62
133.60	24°54.0'	115°02.0'	IV-10	0046	0100	415	0-140	84	84
137.23	25°34.0'	112°19.0'	IV-8	2223	2230	230	0-70	985	985
137.30	25°20.0'	112°45.5'	IV-9	0211	0225	404	0-141	208	208
137.35	25°10.0'	113°04.5'	IV-9	0506	0521	406	0-144	194	155
137.40	25°00.0'	113°23.5'	IV-9	0806	0820	393	0-137	97	97
137.45	24°48.0'	113°42.5'	IV-9	1156	1210	447	0-130	60	60
137.50	24°37.5'	114°02.0'	IV-9	1441	1456	442	0-128	68	68
137.60	24°19.5'	114°39.5'	IV-9	1916	1921	470	0-120	77	77

Plankton Volumes, Cruise 5405, May 1954

60.55	37°48.0'	123°15.0'	V-10	1313	1321	296	0-75	230	230
60.60	37°37.0'	123°37.0'	V-10	1656	1712	500	0-142	192	192
60.70	37°18.0'	124°21.0'	V-10	2121	2136	497	0-139	1040	997
60.80	36°57.0'	125°04.5'	V-11	0348	0402	535	0-117	941	941
60.90	36°37.0'	125°47.0'	V-11	0831	0846	442	0-147	294	240
63.52	37°20.0'	122°38.0'	V-9	1157	1205	261	0-58	161	161
63.55	37°16.0'	122°50.5'	V-9	1020	1035	544	0-125	99	99
67.50	36°49.0'	122°05.5'	V-9	0138	0146	308	0-64	227	227
67.55	36°40.0'	122°24.0'	V-9	0436	0450	493	0-144	246	246
70.51	36°10.5'	121°46.0'	V-13	0055	0110	498	0-126	109	109
70.55	36°03.0'	122°02.0'	V-12	2116	2131	527	0-127	296	254

Sta.	Position N.lat.	W.long.	(1954) Date	Time (PST) Start	End	Vol. water strained C.M.	Depth of haul in meters	Vol.per 1000 C.M.strained Total cc.	Sm.org. cc.
70.60	35°51.5'	122°26.0'	V-12	1818	1833	450	0-152	454	454
70.70	35°35.0'	123°12.0'	V-12	0916	0930	568	0-121	55	55
70.80	35°13.0'	123°48.0'	V-12	0355	0410	531	0-145	79	79
70.90	34°52.5'	124°30.0'	V-11	2016	2030	483	0-132	176	145
73.50	35°37.0'	121°16.5'	V-13	0522	0531	348	0-77	109	109
73.60	35°18.0'	121°58.0'	V-13	1051	1106	475	0-136	291	291
77.50	Occupied. Sample not quantitative								
77.55	34°55.0'	121°14.0'	V-13	2006	2011	471	0-132	255	255
77.65	34°35.5'	121°54.0'	V-13	1526	1541	463	0-134	947	410
80.51	34°35.5'	120°33.0'	V-14	0457	0506	319	0-79	273	273
80.55	34°19.0'	120°48.0'	V-14	0653	0707	545	0-124	182	105
80.60	34°09.0'	121°09.0'	V-14	0956	1010	510	0-126	698	698
80.70	33°48.5'	121°50.5'	V-14	1443	1457	560	0-118	391	361
80.80	33°29.0'	123°32.0'	V-14	2006	2020	505	0-132	91	91
80.90	33°12.5'	123°06.0'	V-15	0011	0126	514	0-126	119	119
82.47	34°16.5'	119°58.0'	V-16	0833	0847	472	0-121	381	381
83.40	34°14.5'	119°22.0'	V-16	1429	1434	227	0-34	718	718
83.43	34°08.0'	119°33.5'	V-16	1226	1240	542	0-119	1772	1772
83.48	33°58.5'	119°55.0'	V-16	0558	0605	247	0-69	696	696
83.51	33°52.0'	120°07.0'	V-16	0331	0342	464	0-78	284	284
83.55	33°42.5'	120°23.5'	V-16	0051	0105	462	0-132	856	553
83.60	33°34.0'	120°49.0'	V-15	2115	2129	508	0-108	787	787
83.70	33°14.5'	121°26.0'	V-15	1601	1615	464	0-129	26	26
83.80	32°49.5'	122°08.0'	V-15	1021	1035	512	0-129	166	166
83.90	32°34.0'	122°47.5'	V-15	0556	0610	463	0-130	56	56
85.39	34°00.0'	119°03.0'	V-16	1703	1710	(405)	0-66	153	153
85.40	33°57.0'	119°10.5'	V-16	1831	1845	482	0-119	650	532
85.45	33°46.0'	119°32.5'	V-16	2116	2130	449	0-132	423	359
85.50	33°37.0'	119°52.0'	V-17	0031	0046	536	0-118	502	463
85.55	33°26.5'	120°13.5'	V-17	0311	0325	514	0-113	315	292
85.60	33°16.5'	120°34.5'	V-17	0641	0655	442	0-127	328	328
87.35	33°50.0'	118°37.5'	V-17	1841	1855	505	0-108	259	259
87.40	33°40.5'	118°59.0'	V-17	2141	2155	391	0-138	332	220
87.45	33°30.0'	119°19.0'	V-18	0056	0110	428	0-136	644	616
87.50	33°20.0'	119°39.5'	V-18	0333	0340	261	0-51	272	272
87.55	33°10.0'	120°00.5'	V-18	0626	0640	533	0-116	253	253
87.60	33°00.0'	120°21.5'	V-18	0916	0930	359	0-133	535	535
87.70	32°38.0'	121°06.0'	V-18	1456	1510	434	0-129	122	106
87.80	32°19.5'	121°46.5'	V-18	1916	1930	458	0-130	63	63
87.90	31°59.0'	122°24.0'	V-19	0011	0026	456	0-129	96	96
90.28	33°28.5'	117°47.0'	V-21	0228	0236	270	0-59	104	104
90.30	33°25.0'	117°55.0'	V-21	0111	0125	475	0-127	166	166
90.33	33°17.5'	118°09.5'	V-20	1321	1336	505	0-117	113	113
90.37	33°11.0'	118°23.5'	V-20	1041	1056	461	0-133	285	243
90.41	33°02.5'	118°39.3'	V-20	0816	0830	431	0-139	638	429

Plankton Volumes, Cruise 5405, May 1954 (cont'd)

Position				Time (PST)		Vol. water strained	Depth of haul	Vol. per 1000 C.M. strained	
			(1954)					Total	Sm.org.
Sta.	N.lat.	W.long.	Date	Start	End	C.M.	in meters	cc.	cc.
90.45	32°54.5'	118°56.0'	V-50	0556	0610	486	0-126	354	354
90.50	32°44.5'	119°16.0'	V-20	0332	0344	403	0-97	112	112
90.55	32°35.0'	119°36.5'	V-20	0011	0025	479	0-124	104	88
90.60	32°25.0'	119°58.0'	V-19	2051	2105	447	0-136	351	295
90.70	32°04.5'	120°39.0'	V-19	1506	1521	424	0-133	73	73
90.80	31°41.5'	121°25.5'	V-19	0916	0930	404	0-141	74	74
90.90	31°26.0'	121°58.5'	V-19	0456	0510	479	0-130	60	60
93.27	32°56.5'	117°19.5'	V-21	0713	0720	204	0-70	103	103
93.30	32°49.5'	117°31.5'	V-21	0901	0916	502	0-123	26	26
93.35	32°40.0'	117°52.0'	V-21	1226	1241	490	0-128	69	69
93.40	32°30.0'	118°12.5'	V-21	1511	1526	488	0-120	158	158
93.45	32°20.0'	118°33.0'	V-21	1746	1800	464	0-128	67	67
93.50	32°09.5'	118°53.0'	V-21	2031	2046	478	0-122	308	237
93.55	32°00.0'	119°14.0'	V-22	0006	0021	485	0-127	206	188
93.60	31°49.5'	119°34.5	V-22	0246	0301	494	0-127	87	87
93.70	31°28.0'	120°17.0'	V-22	0731	0745	555	0-112	65	65
93.80	31°11.0'	120°55.5'	V-22	1221	1236	510	0-117	57	57
93.90	30°50.0'	121°35.0'	V-22	1706	1720	513	0-115	29	29
97.30	32°15.5'	117°09.0'	V-24	0738	0744	200	0-52	140	140
97.32	32°11.5'	117°13.0'	V-24	0621	0635	500	0-120	40	40
97.36	32°03.5'	117°34.0'	V-24	0416	0430	523	0-132	77	77
97.40	31°55.5'	117°49.5'	V-24	0041	0056	466	0-131	88	88
97.45	31°45.5'	118°10.0'	V-23	2146	2200	497	0-131	62	50
97.50	31°35.5'	118°31.0'	V-23	1856	1910	476	0-129	511	46
97.55	31°25.5'	118°51.0'	V-23	1616	1630	493	0-127	81	81
97.60	31°13.0'	119°09.0'	V-23	1256	1311	539	0-109	109	109
97.70	30°54.0'	119°49.0'	V-23	0806	0820	426	0-138	120	120
97.80	30°34.0'	120°31.0'	V-23	0256	0311	457	0-132	66	66
97.90	30°15.0'	121°11.0'	V-22	2156	2210	462	0-128	87	87
100.29	31°42.7'	116°43.7'	V-21	0058	0106	303	0-88	330	330
100.30	31°39.5'	116°47.1'	V-20	2356	0010	479	0-140	73	73
100.35	31°29.3'	117°06.3'	V-20	2141	2156	495	0-128	113	113
100.40	31°20.2'	117°25.4'	V-20	1921	1936	469	0-142	100	100
100.45	31°11.8'	117°45.8'	V-20	1701	1716	431	0-148	79	79
100.50	31°01.4'	118°07.9'	V-20	1411	1426	451	0-143	82	82
100.55	30°48.8'	118°20.2'	V-20	1156	1210	414	0-155	94	94
100.60	30°38.9'	118°41.8'	V-20	0941	0955	496	0-131	93	93
100.70	30°19.6'	119°27.8'	V-20	0451	0506	429	0-149	89	89
100.80	30°00.5'	120°03.8'	V-20	0026	0040	444	0-145	86	86
100.90	29°41.3'	120°44.3'	V-19	1931	1946	449	0-151	36	36
100.100	29°21.8'	120°25.0'	V-19	1531	1546	437	0-147	27	27
103.30	31°05.2'	116°25.0'	V-18	0543	0550	270	0-34	278	278
103.35	30°56.2'	116°43.4'	V-18	0756	0810	496	0-123	61	61
103.40	30°46.6'	117°02.3'	V-18	1026	1040	467	0-140	51	51
103.45	30°34.3'	117°25.9'	V-18	1331	1346	504	0-130	46	46

Plankton Volumes, Cruise 5405, May 1954 (cont'd)

Position				Time (PST)		Vol. water strained	Depth of haul	Vol. per 1000 C.M. strained	
			(1954)					Total	Sm. org.
Sta.	N. lat.	W. long.	Date	Start	End	C.M.	in meters	cc.	cc.
103.50	30°24.1'	117°47.0'	V-18	1556	1610	515	0-121	50	50
103.55	30°16.2'	118°05.8'	V-18	1801	1816	474	0-138	42	42
103.60	30°04.9'	118°26.3'	V-18	2016	2030	484	0-133	48	48
103.70	29°44.5'	119°07.7'	V-19	0051	0105	478	0-128	77	77
103.80	29°24.1'	119°47.8'	V-19	0506	0520	445	0-152	22	22
103.90	29°02.2'	120°26.7'	V-19	1001	1016	464	0-147	26	26
107.32	30°28.3'	116°14.8'	V-18	0141	0156	461	0-136	284	284
107.35	30°19.2'	116°33.8'	V-17	2236	2250	474	0-130	114	114
107.40	30°11.2'	116°49.3'	V-17	2006	2020	485	0-126	68	68
107.45	30°01.8'	117°07.7'	V-17	1746	1800	457	0-134	77	77
107.50	29°58.3'	117°28.7'	V-17	1446	1500	439	0-146	46	46
107.55	29°49.1'	117°48.1'	V-17	1231	1246	478	0-137	27	27
107.60	29°37.2'	118°07.2'	V-17	1011	1026	442	0-148	61	38
107.70	29°15.0'	118°45.2'	V-17	0526	0541	433	0-151	23	23
107.80	28°52.3'	119°22.8'	V-17	0101	0115	406	0-165	37	37
110.33	29°50.3'	115°52.7'	V-15	1458	1506	288	0-93	160	160
110.35	29°46.0'	115°59.8'	V-15	1606	1620	458	0-141	44	44
110.40	29°36.5'	116°19.8'	V-15	1816	1830	468	0-140	102	60
110.45	29°27.8'	116°38.9'	V-15	2116	2131	421	0-147	69	69
110.50	29°18.4'	116°57.9'	V-15	2331	2346	486	0-139	54	54
110.55	29°08.7'	117°17.2'	V-16	0151	0206	434	0-146	55	55
110.60	28°59.3'	117°35.7'	V-16	0416	0430	417	0-146	65	65
110.70	28°35.5'	118°18.8'	V-16	0956	1010	460	0-140	46	46
110.80	28°17.0'	118°58.0'	V-16	1356	1410	426	0-151	38	38
110.90	27°56.5'	119°36.0'	V-16	1856	1910	477	0-133	67	67
113.30	29°26.2'	115°18.7'	V-15	1033	1040	291	0-39	319	319
113.32	29°21.2'	115°30.7'	V-15	0902	0913	383	0-92	413	413
113.35	29°18.0'	115°38.8'	V-15	0706	0720	538	0-110	195	195
113.37	29°12.4'	115°48.8'	V-15	0536	0550	479	0-130	36	36
113.40	29°06.5'	115°58.8'	V-15	0411	0426	448	0-142	25	25
113.42	29°00.8'	116°08.8'	V-15	0246	0300	475	0-132	78	78
113.45	28°55.0'	116°19.0'	V-15	0121	0136	465	0-137	34	34
113.47	28°49.9'	116°28.8'	V-14	2351	0006	454	0-146	59	59
113.50	28°43.9'	116°38.3'	V-14	2156	2210	479	0-136	69	69
113.55	28°33.3'	116°57.0'	V-14	1921	1935	485	0-136	45	45
113.60	28°23.0'	117°17.7'	V-14	1701	1716	461	0-136	61	61
113.70	28°02.0'	117°55.5'	V-14	1216	1230	449	0-135	38	38
117.26	28°51.3'	114°45.8'	V-13	0158	0206	253	0-66	653	653
117.28	28°44.8'	114°56.8'	V-13	0312	0322	344	0-80	349	349
117.30	28°41.3'	115°02.2'	V-13	0417	0428	381	0-89	213	213
117.32	28°37.9'	115°08.1'	V-13	0526	0540	477	0-132	143	143
117.35	28°36.9'	115°17.2'	V-13	0636	0650	467	0-127	137	137
117.37	28°33.0'	115°25.6'	V-13	0751	0806	434	0-136	42	42
117.40	28°27.2'	115°35.8'	V-13	1636	1650	518	0-109	50	50
117.42	28°23.2'	115°45.7'	V-13	1816	1831	380	0-146	50	50

Plankton Volumes, Cruise 5405, May 1954 (cont'd)

Position				Time (PST)		Vol. water strained	Depth of haul	Vol.per 1000 C.M.strained	
			(1954)					Total	Sm.org.
Sta.	N.lat.	W.long.	Date	Start	End	C.M.	in meters	cc.	cc.
117.45	28°18.2'	115°55.3'	V-13	1941	1955	479	0-134	52	52
117.47	28°13.6'	116°05.4'	V-13	2101	2115	531	0-127	79	79
117.50	28°08.0'	116°15.2'	V-13	2226	2241	504	0-126	61	61
117.55	27°57.8'	116°34.0'	V-14	0041	0056	534	0-112	54	54
117.60	27°46.6'	116°53.0'	V-14	0256	0310	504	0-122	97	97
117.70	27°25.3'	117°29.0'	V-14	0726	0740	541	0-113	41	41
120.25	28°23.8'	114°18.2'	V-12	2127	2135	251	0-52	235	235
120.27	28°18.3'	114°27.6'	V-12	2013	2020	248	0-71	415	415
120.30	28°12.8'	114°36.7'	V-12	1858	1906	283	0-63	651	651
120.32	28°07.5'	114°45.3'	V-12	1753	1760	263	0-68	221	221
120.35	28°02.9'	114°54.0'	V-12	1608	1614	233	0-57	343	343
120.37	27°59.6'	115°01.2'	V-12	1453	1500	266	0-52	345	345
120.40	27°55.7'	115°15.0'	V-12	1334	1338	152	0-29	185	185
120.42	27°54.9'	115°31.2'	V-12	1136	1151	408	0-134	113	113
120.45	27°41.0'	115°45.2'	V-12	0936	0950	448	0-133	89	89
120.47	27°36.4'	115°53.0'	V-12	0801	0815	427	0-139	136	136
120.50	27°31.8'	116°01.2'	V-12	0551	0606	538	0-105	236	236
120.55	27°22.2'	116°17.5'	V-12	0326	0340	466	0-138	84	84
120.60	27°12.6'	116°34.2'	V-12	0106	0120	495	0-136	53	53
120.70	26°51.9'	117°10.8'	V-11	2011	2025	451	0-143	47	47
120.80	26°30.5'	117°47.0'	V-11	1546	1600	427	0-151	80	80
120.90	26°24.8'	118°18.0'	V-11	1156	1210	425	0-149	54	54
123.37	27°24.4'	114°40.3'	V-10	0223	0230	192	0-67	229	229
123.40	27°19.3'	114°51.8'	V-10	0356	0411	431	0-147	144	144
123.42	27°13.4'	115°01.3'	V-10	1516	1530	482	0-153	214	214
123.45	27°08.3'	115°11.8'	V-10	1636	1651	491	0-130	94	94
123.47	27°03.4'	115°22.6'	V-10	1801	1816	452	0-148	159	159
123.50	26°58.0'	115°33.5'	V-10	1926	1940	468	0-147	216	216
123.55	26°49.0'	115°54.1'	V-10	2141	2155	453	0-147	203	203
123.60	26°39.0'	116°15.0'	V-11	0006	0020	481	0-138	158	158
127.34	26°56.2'	114°05.2'	V-9	2138	2145	212	0-63	425	425
127.37	26°44.8'	114°19.0'	V-9	1936	1950	484	0-139	155	155
127.40	26°39.2'	114°29.7'	V-9	1746	1800	484	0-142	130	130
127.42	26°35.7'	114°37.7'	V-9	1631	1646	482	0-146	102	102
127.45	26°31.2'	114°48.2'	V-9	1511	1526	464	0-145	60	60
127.47	26°27.3'	114°58.8'	V-9	1336	1350	482	0-139	25	25
127.50	26°20.5'	115°11.9'	V-9	1106	1121	450	0-143	27	27
127.55	26°12.5'	115°26.1'	V-9	0856	0910	489	0-136	57	57
127.60	26°02.7'	115°45.2'	V-9	0636	0650	457	0-151	35	35
130.30	26°27.0'	113°27.9'	V-8	1018	1025	288	0-51	108	108
130.35	26°19.9'	113°48.7'	V-8	1256	1310	421	0-138	47	31
130.40	26°08.7'	114°08.6'	V-8	1516	1530	489	0-130	33	33
130.45	25°58.6'	114°27.6'	V-8	1821	1836	455	0-141	44	44
130.50	25°49.0'	114°46.0'	V-8	2036	2050	457	0-137	39	39
130.55	25°39.0'	115°05.0'	V-8	2256	2311	476	0-142	61	61

Plankton Volumes, Cruise 5405, May 1954 (cont'd)

Position				Time (PST)		Vol. water strained	Depth of haul	Vol.per 1000 C.M.strained	
			(1954)					Total	Sm.org.
Sta.	N.lat.	W.long.	Date	Start	End	C.M.	in meters	cc.	cc.
130.60	25°28.0'	115°23.3'	V-9	0116	0130	442	0-151	54	54
133.25	26°04.0'	112°48.3'	V-8	0558	0606	296	0-69	115	115
133.30	25°54.3'	113°07.9'	V-7	2246	2300	471	0-142	372	372
133.35	25°48.7'	113°29.2'	V-7	2021	2036	459	0-142	105	105
133.40	25°40.5'	113°43.9'	V-7	1826	1840	463	0-140	69	69
133.45	25°25.2'	114°12.5'	V-7	1516	1530	446	0-145	27	27
133.50	25°17.0'	114°25.8'	V-7	1211	1225	502	0-118	36	36
133.60	24°55.4'	114°59.2'	V-7	0756	0810	441	0-144	54	54
137.23	25°36.7'	112°19.2'	V-6	1008	1015	244	0-59	262	262
137.30	25°21.2'	112°47.6'	V-6	1311	1326	429	0-139	238	238
137.35	25°10.6'	113°06.7'	V-6	1531	1546	442	0-139	120	120
137.40	24°55.2'	113°24.9'	V-6	1801	1816	500	0-137	234	234
137.45	24°46.7'	113°40.8'	V-6	2026	2040	451	0-144	71	71
137.50	24°37.9'	114°00.8'	V-6	2241	2256	437	0-144	98	78
137.60	24°16.0'	114°35.0'	V-7	0246	0300	509	0-124	63	63

Plankton Volumes, Cruise 5406, June 1954

50.47	39°46.0'	123°54.2'	VI-5	0818	0827	404	0-63	272	217
50.50	29°38.3'	124°11.3'	VI-5	1103	1118	501	0-122	432	432
50.60	39°20.0'	124°52.0'	VI-5	1506	1520	477	0-138	92	76
50.70	39°00.4'	125°34.0'	VI-5	2016	2031	475	0-134	116	116
50.80	38°40.8'	126°21.0'	VI-6	0036	0050	432	0-147	640	640
50.90	38°22.0'	127°07.0'	VI-6	0546	0601	461	0-142	263	263
50.100	38°00.0'	127°49.0'	VI-6	0926	0940	514	0-126	146	146
53.52	39°02.5'	123°51.8'	VI-5	0353	0401	264	0-83	181	181
53.55	38°55.7'	124°04.3'	VI-5	0151	0205	451	0-140	1332	1332
53.65	38°36.0'	124°51.1'	VI-4	2111	2126	498	0-127	221	221
57.51	38°30.0'	123°22.0'	VI-4	0857	0907	400	0-75	132	132
57.55	38°24.0'	123°41.2'	VI-4	1126	1141	484	0-135	338	338
57.65	38°02.0'	124°23.5'	VI-4	1536	1551	481	0-144	168	168
60.55	37°47.3'	123°14.5'	VI-7	1842	1853	350	0-105	188	188
60.60	37°37.0'	123°37.0'	VI-7	1621	1636	501	0-119	653	653
60.70	37°16.8'	124°18.8'	VI-7	1056	1111	429	0-147	368	326
60.80	36°55.3'	125°08.7'	VI-7	0618	0632	510	0-131	517	517
60.90	36°36.3'	125°49.0'	VI-7	0121	0136	486	0-144	255	255
60.100	36°20.2'	126°31.8'	VI-6	2016	2031	476	0-146	136	101
63.52	37°18.5'	122°36.7'	VI-9	1128	1137	336	0-64	555	110
63.55	37°14.0'	122°49.5'	VI-9	1311	1325	530	0-122	454	454
63.65	36°53.3'	123°33.0'	VI-9	1716	1731	414	0-151	293	293
67.50	36°49.6'	122°04.8'	VI-10	0500	0511	370	0-86	173	173
67.55	36°40.5'	122°26.7'	VI-10	0221	0236	460	0-138	469	469
67.65	36°20.3'	123°06.7'	VI-9	2221	2235	417	0-131	1190	1190
70.52	36°08.5'	121°50.0'	VI-11	1439	1454	507	0-142	538	538
70.55	36°03.6'	122°01.7'	VI-11	1621	1636	490	0-139	481	481

Position				Time (PST)		Vol. water strained	Depth of haul	Vol.per 1000 C.M.strained	
Sta.	N.lat.	W.long.	(1954) Date	Start	End	C.M.	in meters	Total cc.	Sm.org. cc.
70.60	35°54.3'	122°22.7'	VI-11	1936	1950	513	0-124	197	197
70.70	35°33.0'	123°06.0'	VI-11	2346	0000	422	0-131	251	232
70.80	35°13.0'	123°48.0'	VI-12	0506	0520	446	0-141	60	60
70.90	34°52.5'	124°26.3'	VI-12	0906	0921	443	0-149	63	63
70.100	34°31.7'	125°10.2'	VI-12	1401	1416	521	0-126	31	31
73.50	35°37.0'	121°16.4'	VI-10	1248	1256	266	0-86	364	364
73.60	35°17.7'	121°57.9'	VI-11	0806	0821	468	0-139	137	137
77.50	35°04.9'	120°52.2'	VI-10	1647	1659	464	0-101	419	366
77.55	34°54.5'	121°13.0'	VI-10	1949	2004	496	0-118	133	133
77.65			Occupied. Sample not quantitative						
80.51	34°26.5'	120°32.5'	VI-14	0118	0126	315	0-70	130	130
80.55	34°20.2'	120°48.3'	VI-13	2228	2243	481	0-135	691	691
80.60	34°16.5'	121°11.0'	VI-13	1956	2011	475	0-135	563	563
80.70			Occupied. Sample not quantitative						
80.80	33°27.8'	122°31.8'	VI-13	1041	1056	472	0-143	76	76
80.90	33°14.0'	123°16.0'	VI-13	0636	0651	497	0-149	84	84
80.100	32°49.0'	123°54.0'	VI-13	0106	0120	508	0-140	91	91
82.47	34°15.2'	119°59.2'	VI-14	0531	0546	539	0-127	1214	1214
83.40	34°14.2'	119°23.7'	VI-14	0945	0946	65	0-13	200	200
83.43	34°08.4'	119°33.9'	VI-14	0820	0835	464	0-131	2683	2661
83.48	33°58.3'	119°55.0'	VI-15	0711	0725	511	0-104	184	122
83.51	33°52.0'	120°08.3'	VI-15	0921	0932	446	0-68	112	112
83.55	33°43.7'	120°25.7'	VI-15	1101	1116	409	0-140	2538	2538
83.60	33°34.0'	120°45.0'	VI-15	1416	1430	432	0-148	878	878
83.70	33°14.2'	121°27.2'	VI-15	1811	1826	505	0-133	539	539
83.80	32°55.7'	122°07.9'	VI-15	2320	2334	495	0-128	283	220
83.90	32°38.3'	122°51.1'	VI-16	0311	0326	502	0-130	179	179
85.39	33°59.8'	119°04.3'	VI-14	1251	1306	472	0-118	117	117
85.45	33°47.0'	119°31.2'	VI-14	1801	1816	557	0-109	104	104
85.50	33°36.8'	119°51.7'	VI-14	2011	2026	401	0-150	456	456
85.55	33°25.7'	120°13.3'	VI-14	2316	2331	435	0-147	676	662
85.60	33°13.7'	120°31.8'	VI-15	0121	0135	436	0-135	824	824
87.35	33°50.8'	118°38.4'	VI-17	1136	1150	452	0-139	161	161
87.40	33°40.4'	118°58.8'	VI-17	0933	0948	441	0-135	247	116
87.45	33°29.8'	119°18.5'	VI-17	0636	0651	524	0-126	772	772
87.50	33°20.6'	119°40.3'	VI-17	0413	0421	256	0-57	4442	4442
87.55	33°08.0'	119°59.7'	VI-17	0116	0131	510	0-134	635	635
87.60	33°00.0'	120°21.5'	VI-16	2251	2306	526	0-126	441	441
87.70			Not occupied						
87.80	32°14.5'	121°42.8'	VI-16	1256	1310	534	0-126	181	181
87.90	32°02.9'	122°27.8'	VI-16	0746	0801	567	0-131	40	40
90.28	33°28.2'	117°47.4'	VI-17	2226	2240	415	0-131	258	258
90.30	33°23.8'	117°55.7'	VI-17	2326	2341	494	0-125	291	265
90.33	33°17.4'	118°10.0'	VI-18	0121	0136	581	0-119	127	79
90.37	33°11.0'	118°23.5'	VI-18	0351	0406	554	0-110	76	76

Plankton Volumes, Cruise 5406, June 1954 (cont'd)

Position				Time (PST)		Vol. water strained	Depth of haul	Vol.per 1000 C.M.strained	
			(1954)					Total	Sm.org.
Sta.	N.lat.	W.long.	Date	Start	End	C.M.	in meters	cc.	cc.
90.41	33°02.7'	118°39.8'	VI-18	0556	0611	522	0-123	140	111
90.45	32°54.5'	118°56.0'	VI-18	0756	0811	531	0-126	115	115
90.50	32°44.3'	119°17.5'	VI-18	1026	1040	546	0-134	401	392
90.55	32°34.8'	119°36.8'	VI-18	1326	1340	408	0-136	201	201
90.60	32°25.0'	119°57.5'	VI-18	1536	1550	385	0-132	218	218
90.70	32°04.7'	120°36.5'	VI-18	2039	2054	416	0-130	360	360
90.80	31°45.0'	121°19.0'	VI-19	0056	0111	397	0-134	202	202
93.27	32°55.4'	117°18.7'	VI-20	1701	1716	409	0-130	1455	402
93.30	32°53.0'	117°32.1'	VI-20	1536	1551	425	0-108	289	230
93.35	32°48.2'	117°53.0'	VI-20	1301	1316	438	0-130	82	82
93.40			Occupied. Sample not quantitative						
93.45	32°38.2'	118°37.2'	VI-20	0836	0850	456	0-113	107	107
93.50	32°33.3'	118°58.6'	VI-20	0641	0656	438	0-134	192	192
93.55	32°26.2'	119°21.6'	VI-20	0336	0350	396	0-128	1660	1660
93.60	32°09.5'	119°40.5'	VI-20	0111	0125	391	0-130	407	407
93.70	31°39.0'	120°13.0'	VI-19	2016	2030	441	0-116	186	186
93.80			Not occupied						
93.90			Occupied. Sample not quantitative						
97.30	32°15.5'	117°09.0'	VI-22	1723	1729	178	0-48	168	168
97.32	32°11.5'	117°17.0'	VI-22	1546	1600	514	0-132	78	78
97.36	32°03.0'	117°33.5'	VI-22	1341	1356	427	0-141	333	333
97.40	31°51.0'	117°49.5'	VI-22	1031	1046	487	0-138	57	57
97.45	31°43.0'	118°09.5'	VI-22	0846	0900	509	0-139	96	96
97.50	31°35.0'	118°30.0'	VI-22	0556	0610	476	0-138	67	67
97.55	31°26.0'	118°47.0'	VI-22	0346	0400	498	0-135	92	92
97.60	31°15.5'	119°09.0'	VI-22	0046	0100	511	0-132	92	92
97.70	30°55.0'	119°50.0'	VI-21	2001	2016	504	0-135	206	197
97.80	30°35.5'	120°31.0'	VI-21	1456	1510	493	0-134	162	162
97.90	30°15.0'	121°12.5'	VI-21	1026	1041	538	0-139	89	89
100.29	31°42.0'	116°43.5'	VI-19	1958	2007	306	0-84	271	271
100.30	31°40.5'	116°46.5'	VI-19	2046	2100	523	0-140	124	124
100.35	31°31.0'	117°07.0'	VI-19	2306	2320	484	0-139	81	81
100.40	31°21.0'	117°27.5'	VI-20	0136	0151	467	0-144	94	94
100.45	31°13.0'	117°47.0'	VI-20	0356	0411	482	0-146	152	152
100.50	31°04.5'	118°07.0'	VI-20	0626	0640	484	0-137	41	41
100.55	30°56.5'	118°23.5'	VI-20	1006	1020	498	0-138	72	72
100.60	30°45.5'	118°44.0'	VI-20	1241	1256	515	0-127	58	58
100.70	30°21.0'	119°27.0'	VI-20	1751	1805	477	0-140	113	113
100.80	30°01.0'	120°07.0'	VI-20	2301	2316	471	0-143	170	170
100.90	29°40.5'	120°47.0'	VI-21	0321	0336	568	0-133	74	60
103.30	31°05.5'	116°25.0'	VI-19	1448	1454	212	0-57	203	203
103.35	30°55.5'	116°46.0'	VI-19	1221	1236	471	0-137	62	62
103.40	30°45.5'	117°05.5'	VI-19	0921	0936	489	0-141	53	53
103.45	30°36.5'	117°24.5'	VI-19	0701	0716	472	0-139	76	76
103.50	30°23.0'	117°44.0'	VI-19	0426	0441	462	0-145	87	87

Plankton Volumes, Cruise 5406, June 1954 (cont'd)

Position			(1954)	Time (PST)		Vol. water strained	Depth of haul	Vol. per 1000 C.M. strained	
								Total	Sm.org.
Sta.	N.lat.	W.long.	Date	Start	End	C.M.	in meters	cc.	cc.
103.55	30°14.0'	118°04.5'	VI-19	0156	0210	478	0-144	103	103
103.60	30°04.5'	118°24.0'	VI-18	2251	2306	511	0-136	51	51
103.70	29°43.5'	119°03.5'	VI-18	1801	1816	476	0-138	46	46
103.80	29°25.5'	119°46.0'	VI-18	1246	1301	492	0-137	37	37
107.32	30°26.0'	116°11.0'	VI-17	0946	1001	490	0-142	41	41
107.35	30°21.5'	116°23.0'	VI-17	1126	1140	442	0-144	29	29
107.40	30°10.0'	116°43.0'	VI-17	1426	1440	461	0-142	52	52
107.45	30°00.0'	117°03.0'	VI-17	1646	1701	460	0-141	70	70
107.50	29°49.0'	117°23.0'	VI-17	1921	1936	472	0-136	76	76
107.55	29°39.0'	117°42.5'	VI-17	2231	2246	469	0-143	113	113
107.60	29°29.5'	118°02.5'	VI-18	0106	0121	538	0-129	113	113
107.70	29°11.0'	118°42.0'	VI-18	0451	0506	447	0-143	89	89
110.33	29°50.5'	115°52.5'	VI-16	1537	1546	289	0-66	228	228
110.35	29°46.5'	116°00.0'	VI-16	1701	1716	498	0-136	60	60
110.40	29°36.0'	116°21.0'	VI-16	1921	1936	468	0-140	66	66
110.45	29°26.5'	116°39.5'	VI-16	2256	2311	466	0-141	99	99
110.50	29°17.5'	116°57.0'	VI-17	0110	0126	473	0-144	76	76
110.55	29°06.0'	117°20.0'	VI-15	2330	2346	551	0-140	91	91
110.60	28°56.5'	117°40.0'	VI-15	2016	2031	498	0-136	72	72
110.70	28°37.0'	118°18.0'	VI-15	1551	1606	473	0-143	51	51
110.80	28°14.0'	118°57.5'	VI-15	1021	1036	489	0-138	37	37
113.30	29°21.5'	115°19.0'	VI-14	0332	0340	287	0-65	307	307
113.32	29°17.5'	115°27.0'	VI-14	0442	0453	384	0-105	299	299
113.35	29°11.0'	115°38.5'	VI-14	0606	0620	486	0-138	142	142
113.37	29°07.0'	115°48.5'	VI-14	0821	0836	462	0-143	184	184
113.40	29°01.5'	115°58.5'	VI-14	0951	1006	518	0-134	60	60
113.42	28°56.5'	116°08.0'	VI-14	1126	1140	490	0-138	45	45
113.45	28°52.0'	116°17.0'	VI-14	1301	1316	514	0-132	45	45
113.47	28°47.0'	116°27.0'	VI-14	1431	1446	516	0-133	58	58
113.50	28°42.0'	116°37.0'	VI-14	1601	1616	518	0-139	44	44
113.55	28°32.0'	116°56.5'	VI-14	2046	2100	463	0-142	104	104
113.60	28°22.5'	117°16.0'	VI-14	2321	2336	496	0-141	99	99
113.70	28°02.0'	117°56.5'	VI-15	0341	0356	493	0-139	65	65
117.26	28°56.0'	114°41.0'	VI-13	2153	2200	261	0-71	1164	1164
117.28	28°52.0'	114°48.5'	VI-13	2028	2036	219	0-66	517	517
117.30	28°48.0'	114°56.5'	VI-13	1858	1906	329	0-81	143	143
117.32	28°43.0'	115°06.5'	VI-13	1726	1740	462	0-134	63	63
117.35	28°38.0'	115°17.0'	VI-13	1551	1606	515	0-144	51	51
117.37	28°31.0'	115°27.0'	VI-13	1406	1420	522	0-143	17	17
117.40	28°28.0'	115°36.0'	VI-13	0225	0241	529	0-140	98	98
117.42	28°23.0'	115°45.5'	VI-13	0050	0106	511	0-148	67	67
117.45	28°18.0'	115°55.5'	VI-12	2316	2331	473	0-141	146	146
117.47	28°11.0'	116°04.0'	VI-12	2111	2126	469	0-141	87	87
117.50	28°04.5'	116°12.5'	VI-12	1936	1950	480	0-146	113	113
117.55	27°55.0'	116°32.0'	VI-12	1701	1715	444	0-141	130	130

Plankton Volumes, Cruise 5406, June 1954 (cont'd)

Position				Time (PST)		Vol. water strained	Depth of haul	Vol. per 1000 C.M. strained	
			(1954)					Total	Sm.org.
Sta.	N.lat.	W.long.	Date	Start	End	C.M.	in meters	cc.	cc.
117.60	27°41.0'	116°58.5'	VI-12	1156	1210	498	0-137	22	22
117.70	27°24.0'	117°30.5'	VI-12	0741	0756	436	0-149	92	92
120.25	28°23.0'	114°14.5'	VI-9	1144	1148	145	0-34	34	34
120.27	28°18.0'	114°24.0'	VI-9	1318	1325	256	0-61	211	180
120.30	28°13.0'	114°34.0'	VI-9	1442	1452	281	0-84	299	256
120.32	28°07.5'	114°44.5'	VI-9	1557	1606	258	0-69	132	132
120.35	28°02.5'	114°55.0'	VI-9	1728	1736	249	0-70	261	261
120.37	27°58.5'	115°03.0'	VI-9	1853	1900	238	0-62	404	404
120.40	27°55.5'	115°16.0'	VI-10	1849	1853	166	0-36	24	24
120.42	27°48.0'	115°23.0'	VI-10	1956	2010	548	0-135	140	140
120.45	27°42.0'	115°33.0'	VI-10	2126	2140	511	0-136	57	57
120.47	27°37.5'	115°42.0'	VI-10	2256	2310	506	0-135	38	38
120.50	27°33.0'	115°52.0'	VI-11	0021	0036	487	0-140	98	98
120.55	27°22.5'	116°12.0'	VI-11	0406	0421	500	0-134	112	112
120.60	27°13.0'	116°32.0'	VI-11	0636	0651	512	0-125	123	123
120.70	26°56.0'	117°09.0'	VI-11	1101	1116	446	0-143	38	38
120.80	26°32.0'	117°49.0'	VI-11	1646	1700	464	0-141	73	73
120.90	26°12.0'	118°27.0'	VI-11	2106	2120	441	0-143	20	20
123.37	27°24.0'	114°40.0'	VI-9	0102	0110	295	0-63	329	329
123.40	27°18.0'	114°52.0'	VI-8	2236	2250	580	0-125	66	66
123.42	27°13.0'	115°01.5'	VI-8	2106	2120	530	0-138	126	126
123.45	27°08.0'	115°11.0'	VI-8	1931	1946	461	0-144	72	72
123.47	27°03.0'	115°21.0'	VI-8	1801	1815	486	0-141	35	35
123.50	26°58.0'	115°30.5'	VI-8	1621	1636	513	0-137	39	39
123.55	26°47.5'	115°50.0'	VI-8	1356	1410	482	0-147	100	100
123.60	26°37.0'	116°09.5'	VI-8	1051	1105	491	0-142	61	61
127.34	26°55.0'	114°06.0'	VI-7	1248	1255	217	0-66	161	161
127.37	26°49.5'	114°17.0'	VI-7	1431	1446	308	0-148	139	139
127.40			Occupied. Sample not quantitative						
127.42	26°38.5'	114°38.0'	VI-7	1801	1816	433	0-140	120	120
127.45	26°33.0'	114°48.0'	VI-7	1935	1951	477	0-140	94	57
127.47	26°27.5'	114°58.0'	VI-7	2111	2125	491	0-141	104	104
127.50	26°22.0'	115°07.5'	VI-7	2246	2300	553	0-128	58	58
127.55	26°10.5'	115°27.0'	VI-8	0216	0230	478	0-141	71	71
127.60	26°01.0'	115°47.5'	VI-8	0511	0526	512	0-136	29	29
130.30	26°29.0'	113°29.5'	VI-7	0743	0750	252	0-56	103	103
130.35	26°17.0'	113°48.0'	VI-7	0506	0521	440	0-141	43	43
130.40	26°08.0'	114°09.5'	VI-7	0106	0120	497	0-139	99	87
130.45	25°58.5'	114°27.0'	VI-6	2236	2250	471	0-145	59	59
130.50	25°50.0'	114°46.5'	VI-6	2000	2015	491	0-141	120	120
130.55	25°40.0'	115°07.0'	VI-6	1716	1731	503	0-137	48	36
130.60	25°29.0'	115°27.0'	VI-6	1406	1420	494	0-135	32	32
133.25	26°04.0'	112°50.0'	VI-5	1532	1540	285	0-70	3027	3027
133.30	25°54.0'	113°07.0'	VI-5	1741	1756	498	0-136	106	106
133.35	25°44.0'	113°26.5'	VI-5	2031	2045	440	0-140	528	528

Plankton Volumes, Cruise 5406, June 1954 (cont'd)

Position				Time (PST)		Vol. water strained	Depth of haul	Vol.per 1000 C.M.strained	
			(1954)					Total	Sm.org.
Sta.	N.lat.	W.long.	Date	Start	End	C.M.	in meters	cc.	cc.
133.40	25°34.0'	113°45.0'	VI-5	2306	2320	487	0-132	134	134
133.45	25°23.5'	114°04.0'	VI-6	0141	0156	488	0-139	90	90
133.50	25°12.5'	114°22.5'	VI-6	0421	0436	484	0-129	221	155
137.23	25°33.5'	112°20.5'	VI-5	1013	1020	274	0-51	361	361
137.30	25°20.0'	112°45.5'	VI-5	0641	0656	485	0-120	119	119
137.35	25°04.5'	113°03.0'	VI-5	0336	0350	449	0-148	178	147
137.40	24°56.0'	113°22.5'	VI-5	0016	0030	444	0-139	97	97
137.45	24°47.5'	113°42.0'	VI-4	2121	2135	489	0-143	61	61
137.50	24°39.0'	114°01.5'	VI-4	1846	1900	504	0-132	52	52
			Plankton Volumes, Cruise 5407, July 1954						
60.55	37°46.5'	123°17.0'	VII-10	1946	2000	515	0-128	361	361
60.60	37°37.0'	123°37.0'	VII-10	2206	2221	448	0-128	482	482
60.70	37°16.0'	124°22.0'	VII-11	0406	0421	511	0-132	399	399
60.80	36°56.0'	125°04.0'	VII-11	0821	0836	458	0-135	159	159
60.90	36°35.5'	125°47.0'	VII-11	1359	1413	494	0-131	160	160
60.100	36°17.0'	126°30.0'	VII-11	1835	1850	539	0-126	111	91
63.52	37°18.0'	122°36.0'	VII-10	1424	1429	206	0-44	282	282
63.55	37°14.0'	122°50.0'	VII-10	1236	1250	497	0-133	568	451
67.50	36°49.0'	122°05.0'	VII-9	2249	2257	282	0-70	1584	1063
67.55	36°38.5'	122°25.5'	VII-10	0056	0110	(506)	0-123	641	641
67.65	36°19.0'	123°09.0'	VII-10	0526	0540	520	0-118	237	237
70.52	36°08.0'	121°49.0'	VII-13	0305	0320	478	0-144	543	543
70.55	36°02.0'	122°01.5'	VII-13	0026	0040	482	0-139	479	438
70.60	35°52.0'	122°23.0'	VII-12	2156	2210	500	0-129	376	376
70.70	35°33.0'	123°06.0'	VII-12	1616	1630	544	0-120	31	31
70.80	35°11.5'	123°47.5'	VII-12	1049	1104	505	0-134	36	36
73.50			Occupied. Sample not quantitative						
73.60			Occupied. Sample not quantitative						
77.50	35°04.0'	120°52.0'	VII-14	0237	0249	398	0-123	623	623
77.55	34°54.5'	121°13.0'	VII-13	2316	2331	490	0-144	710	710
77.65	34°34.0'	121°55.0'	VII-13	1828	1844	508	0-134	535	535
80.51	34°27.5'	120°30.5'	VII-14	0729	0733	161	0-33	174	174
80.55	34°19.5'	120°48.5'	VII-14	0930	0935	520	0-124	119	119
80.60	34°09.0'	121°08.5'	VII-14	1240	1254	519	0-118	486	486
80.70	33°49.0'	121°50.0'	VII-14	1711	1726	503	0-125	378	378
80.80	33°29.0'	122°32.0'	VII-14	2255	2311	524	0-134	164	164
80.90	33°09.0'	123°13.0'	VII-15	0337	0352	512	0-133	174	92
82.47	34°15.0'	119°58.0'	VII-16	0549	0604	550	0-128	67	67
83.40	34°15.0'	119°23.0'	VII-16	1220	1222	(61)	0-13	131	131
83.43	34°08.0'	119°34.0'	VII-16	1056	1111	464	0-135	60	60
83.48	33°58.5'	119°55.0'	VII-16	0254	0302	282	0-68	103	103
83.51	33°52.0'	120°08.5'	VII-16	0029	0040	454	0-86	66	66
83.55	33°40.0'	120°18.5'	VII-15	2106	2120	553	0-127	427	427

Plankton Volumes, Cruise 5407, July 1954 (cont'd)

Sta.	Position N.lat.	W.long	(1954) Date	Time (PST) Start	End	Vol. water strained C.M.	Depth of haul in meters	Vol.per 1000 C.M.strained Total cc.	Sm.org. cc.
83.60	33°34.0'	120°45.0'	VII-15	1715	1730	478	0-147	668	511
85.39			Occupied. Sample not quantitative						
85.40	33°57.0'	119°10.5'	VII-16	1634	1648	501	0-128	116	116
85.45	33°47.0'	119°31.0'	VII-16	1846	1901	509	0-128	114	114
85.50	33°37.0'	119°52.0'	VII-16	2156	2211	474	0-134	230	230
85.55	33°27.0'	120°12.5'	VII-17	0038	0052	477	0-122	237	237
85.60	33°15.5'	120°32.0'	VII-17	0416	0431	412	0-147	403	403
87.35	33°50.0'	118°37.5'	VII-17	2101	2116	(523)	0-118	172	172
87.40	33°40.5'	118°59.0'	VII-17	1806	1820	(534)	0-116	487	487
87.45	33°30.0'	119°19.0'	VII-17	1526	1540	345	0-139	203	203
87.50	33°20.0'	119°39.5'	VII-17	1305	1310	193	0-48	367	367
87.55	33°10.0'	120°00.5'	VII-17	1026	1041	413	0-148	482	482
87.60	32°56.5'	120°21.0'	VII-17	0657	0712	455	0-145	686	686
90.28	33°28.5'	117°47.0'	VII-18	0201	0216	450	0-115	238	238
90.30	33°24.0'	117°55.5'	VII-18	0356	0410	440	0-138	168	168
90.37	33°11.0'	118°22.0'	VII-18	0813	0828	351	0-146	51	51
90.45	32°54.5'	118°56.5'	VII-19	1226	1240	(443)	0-142	79	79
90.55	32°35.0'	119°37.0'	VII-19	1642	1656	413	0-143	278	278
90.60	32°25.0'	119°57.5'	VII-19	2016	2030	411	0-134	253	253
90.70	32°07.0'	120°34.0'	VII-20	0101	0116	479	0-140	435	435
93.27	32°56.0'	117°19.0'	VII-21	0026	0039	(424)	0-118	717	717
93.30	32°50.0'	117°31.5'	VII-20	2149	2304	547	0-130	216	216
93.35	32°40.0'	117°52.0'	VII-20	1916	1931	396	0-132	106	106
93.40	32°30.0'	118°12.5'	VII-20	1649	1704	352	0-159	580	580
93.45	32°20.0'	118°33.0'	VII-20	1418	1432	340	0-124	882	882
93.50	32°11.0'	118°53.5'	VII-20	1053	1108	354	0-151	209	209
97.30	32°14.5'	117°09.5'	VII-21	0513	0519	138	0-49	2143	2143
97.32	32°10.5'	117°17.0'	VII-21	0611	0626	489	0-138	190	190
97.40	31°57.0'	117°50.5'	VII-21	0950	1004	432	0-114	239	239
97.45	31°47.0'	118°11.0'	VII-21	1311	1326	474	0-117	203	203
97.50	31°37.0'	118°31.5'	VII-21	1539	1554	381	0-135	74	74
100.29	31°42.2'	116°43.4'	VII-18	0721	0734	475	0-115	65	65
100.30	31°41.5'	116°46.8'	VII-18	0631	0645	530	0-125	68	68
100.35	31°35.0'	117°09.5'	VII-18	0346	0400	489	0-135	84	84
100.40	31°23.5'	117°29.1'	VII-18	0126	0140	495	0-137	99	99
100.45	31°13.3'	117°48.8'	VII-17	2317	2328	333	0-113	84	84
100.50	31°02.5'	118°08.5'	VII-17	1956	2010	468	0-137	122	122
100.60	30°42.0'	118°49.5'	VII-17	1526	1540	475	0-139	53	53
100.70	30°18.4'	119°21.5'	VII-17	1011	1026	453	0-142	68	68
100.80	30°02.2'	119°54.0'	VII-17	0646	0700	477	0-137	71	71
103.30	31°05.9'	116°25.2'	VII-16	0948	0956	204	0-68	568	568
103.35	30°56.0'	116°45.6'	VII-16	1216	1231	478	0-134	50	50
103.40	30°45.1'	117°07.0'	VII-16	1451	1506	431	0-145	51	51
107.32	30°27.3'	116°11.0'	VII-16	0546	0600	432	0-150	93	93
107.35	30°20.9'	116°23.5'	VII-16	0321	0335	444	0-140	68	68

Plankton Volumes, Cruise 5407, July 1954 (cont'd)

Position				Time (PST)		Vol. water strained	Depth of haul	Vol.per 1000 C.M.strained	
			(1954)					Total	Sm.org.
Sta.	N.lat.	W.long.	Date	Start	End	C.M.	in meters	cc.	cc.
107.40	30°10.5'	116°43.5'	VII-16	0101	0116	449	0-148	220	220
110.33	29°51.8'	115°54.5'	VII-15	0111	0126	418	0-154	86	86
110.35	29°46.5'	116°00.0'	VII-15	0246	0300	466	0-136	172	172
110.40	29°36.5'	116°16.0'	VII-15	0511	0526	486	0-132	125	125
110.45	29°27.5'	116°34.1'	VII-15	0806	0821	441	0-149	82	82
110.50	29°18.0'	116°52.3'	VII-15	1006	1020	439	0-153	59	59
110.60	28°55.8'	117°45.0'	VII-15	1455	1510	467	0-147	60	60
113.30	29°23.1'	115°18.5'	VII-14	2023	2029	262	0-50	375	375
113.35	29°10.6'	115°41.5'	VII-14	1611	1626	430	0-152	63	63
113.40	29°02.1'	115°58.0'	VII-14	1356	1410	476	0-144	46	46
117.26	28°55.4'	114°41.5'	VII-14	0228	0236	263	0-63	350	350
117.30	28°45.8'	115°00.8'	VII-14	0412	0424	347	0-104	557	557
117.35	28°36.9'	115°18.2'	VII-14	0621	0636	406	0-147	104	104
117.40	28°27.0'	115°37.0'	VII-14	0821	0836	458	0-139	26	26
120.25	28°23.0'	114°14.5'	VII-13	2155	2202	191	0-65	283	283
120.30	28°13.8'	114°33.6'	VII-13	1943	1951	226	0-85	346	346
120.35	28°03.2'	114°53.2'	VII-13	1710	1718	225	0-70	138	138
120.45	27°43.0'	115°32.8'	VII-13	0501	0516	384	0-147	200	200
120.50	27°35.4'	115°37.1'	VII-13	0151	0206	407	0-141	307	307
120.60	27°15.0'	116°25.0'	VII-12	2106	2121	452	0-145	71	58
120.70	26°55.0'	117°24.2'	VII-12	1451	1506	468	0-141	77	77
120.80	26°39.9'	117°49.5'	VII-12	1141	1156	447	0-143	87	87
120.90	26°12.2'	118°24.1'	VII-12	0635	0650	469	0-140	55	55
123.37	27°24.0'	114°39.7'	VII-10	2333	2340	200	0-51	355	355
123.40	27°18.0'	114°51.5'	VII-11	0106	0121	485	0-138	91	91
123.45	27°08.2'	115°10.8'	VII-11	0406	0420	478	0-137	84	84
123.50	26°58.0'	115°30.5'	VII-11	1446	1501	457	0-146	22	22
127.34	26°55.3'	114°06.0'	VII-10	1848	1854	238	0-52	227	227
127.40	26°45.9'	114°32.5'	VII-10	1556	1610	491	0-142	122	122
127.45	26°34.2'	114°48.7'	VII-10	1341	1356	469	0-156	151	151
127.50	26°24.5'	115°12.1'	VII-10	0951	1005	473	0-137	93	93
130.30	26°29.8'	113°29.2'	VII-9	1128	1135	218	0-82	101	101
130.35	26°16.3'	113°52.8'	VII-9	1406	1421	552	0-114	118	72
130.40	26°07.9'	114°06.8'	VII-9	1606	1620	483	0-138	37	37
130.45	25°59.0'	114°26.9'	VII-9	1951	2005	446	0-120	65	65
130.50	25°49.0'	114°46.0'	VII-9	2211	2226	469	0-145	198	198
130.60	25°29.0'	115°24.0'	VII-10	0226	0240	451	0-146	118	118
133.25	26°04.5'	112°48.0'	VII-9	0707	0716	302	0-84	458	458
133.30	25°53.6'	113°08.8'	VII-9	0356	0410	456	0-131	186	186
133.35	25°43.6'	113°28.0'	VII-9	0121	0136	441	0-151	181	181
133.40	25°35.3'	113°43.9'	VII-8	2306	2320	481	0-138	324	324
137.23	25°34.2'	112°18.7'	VII-8	1308	1316	271	0-69	505	505
137.30	25°20.0'	112°45.5'	VII-8	1731	1745	479	0-139	342	296

Plankton Volumes, Cruise 5408, August 1954

Position				Time (PST)		Vol. water strained	Depth of haul	Vol. per 1000 C.M. strained	
			(1954)					Total	Sm. org.
Sta.	N. lat.	W. long.	Date	Start	End	C.M.	in meters	cc.	cc.
60.55	37°47.5'	123°14.6'	VIII-31	1212	1224	314	0-112	661	636
60.60	37°36.0'	123°38.3'	VIII-31	1456	1511	516	0-142	298	277
60.70	37°17.0'	124°20.0'	VIII-31	2006	2020	448	0-138	384	384
60.80	36°58.8'	125°09.6'	IX-1	0001	0016	500	0-139	170	126
60.90	36°36.0'	125°57.8'	IX-1	0601	0615	501	0-131	106	106
60.100	36°25.5'	126°28.0'	IX-1	0846	0901	584	0-122	373	283
63.52	37°19.7'	122°32.9'	VIII-27	1616	1621	142	0-49	711	711
63.55	37°12.9'	122°48.8'	VIII-27	1326	1341	458	0-149	393	393
67.50	36°45.8'	122°04.0'	VIII-27	0001	0016	564	0-144	383	383
67.55	36°40.9'	122°28.0'	VIII-27	0311	0326	548	0-136	379	379
67.65	36°20.2'	123°12.3'	VIII-27	0839	0854	514	0-131	257	257
70.52	36°07.5'	121°50.8'	IX-2	1452	1507	569	0-130	113	113
70.55	36°03.0'	122°01.2'	IX-2	1226	1241	494	0-127	162	162
70.60	35°53.0'	122°22.0'	IX-2	0926	0940	472	0-141	282	282
70.70	35°33.0'	123°05.5'	IX-2	0456	0511	650	0-106	898	898
70.80	35°14.0'	123°44.5'	IX-2	0004	0019	528	0-136	47	47
73.50	35°37.2'	121°17.5'	IX-3	0127	0138	370	0-109	1084	962
73.55	35°26.8'	121°39.0'	IX-2	2246	2301	412	0-143	1979	1979
73.60	35°16.7'	121°58.5'	IX-2	1946	2000	399	0-153	561	561
77.50	35°03.8'	120°56.0'	IX-3	0516	0531	477	0-148	293	293
77.55	34°53.5'	121°20.7'	IX-3	0736	0750	478	0-143	905	905
77.65	34°38.5'	121°54.5'	IX-3	1156	1211	509	0-137	65	65
80.51	34°25.7'	120°33.5'	IX-5	0207	0219	436	0-117	41	41
80.55	34°16.5'	120°50.3'	IX-4	2314	2329	523	0-147	290	290
80.60	34°06.0'	121°12.0'	IX-4	2036	2051	483	0-143	261	261
80.70	33°48.2'	121°51.0'	IX-4	1531	1546	546	0-138	146	135
80.80	33°30.5'	122°30.0'	IX-4	1151	1206	495	0-137	226	226
80.90	33°05.0'	123°15.0'	IX-4	0526	0541	512	0-143	29	29
80.100	32°49.5'	123°54.0'	IX-4	0101	0116	475	0-141	80	80
82.47	34°15.0'	119°59.0'	IX-5	0541	0556	482	0-132	54	54
83.40	34°13.8'	119°22.5'	IX-5	1044	1047	102	0-19	39	39
83.43	34°08.0'	119°35.5'	IX-5	0846	0900	489	0-132	35	35
83.48	33°57.5'	119°54.8'	IX-5	1412	1423	369	0-97	33	33
83.51	33°51.5'	120°08.0'	IX-5	1541	1556	564	0-129	75	75
83.55	33°43.5'	120°25.0'	IX-5	1752	1807	453	0-151	119	119
83.60	33°34.5'	120°46.5'	IX-5	2026	2040	463	0-147	155	155
85.39	33°59.2'	119°04.3'	IX-6	1146	1201	514	0-140	58	58
85.40	33°57.8'	119°09.2'	IX-6	1051	1105	668	0-109	28	28
85.45	33°49.0'	119°32.5'	IX-6	0746	0801	531	0-128	36	36
85.50	33°36.5'	119°55.0'	IX-6	0506	0521	542	0-129	79	79
85.55	33°27.0'	120°16.0'	IX-6	0156	0211	513	0-136	146	146
85.60	33°19.2'	120°35.5'	IX-5	2326	2341	461	0-147	221	221
87.35	33°49.0'	118°37.5'	IX-6	1446	1501	477	0-137	65	65
87.40	33°39.5'	118°59.5'	IX-6	1701	1716	466	0-144	56	56
87.45	33°29.5'	119°20.0'	IX-6	1946	2001	511	0-128	137	137

Plankton Volumes, Cruise 5408, August 1954 (cont'd)

Sta.	Position N.lat.	Position W.long.	(1954) Date	Time (PST) Start	Time (PST) End	Vol. water strained C.M.	Depth of haul in meters	Vol.per 1000 C.M.strained Total cc.	Vol.per 1000 C.M.strained Sm.org. cc.
87.50	33°20.6'	119°40.2'	IX-6	2218	2225	224	0-53	85	85
87.55	33°10.2'	120°02.7'	IX-7	0100	0115	536	0-139	194	194
87.60	32°58.6'	120°28.4'	IX-7	0336	0351	537	0-133	209	190
90.28	33°28.5'	117°45.0'	IX-8	0909	0913	195	0-26	36	36
90.30	33°23.5'	117°54.2'	IX-8	0736	0751	551	0-123	125	125
90.37	33°10.4'	118°22.8'	IX-8	0411	0426	504	0-141	32	32
90.45	32°57.0'	118°50.6'	IX-8	0111	0126	497	0-134	72	72
90.55	32°28.3'	119°39.0'	IX-7	1936	1950	478	0-143	126	126
90.60	32°20.4'	119°56.1'	IX-7	1716	1731	516	0-140	50	50
90.70	32°05.0'	120°42.0'	IX-7	1111	1126	535	0-134	73	73
93.27	32°55.0'	117°17.7'	IX-8	1303	1310	249	0-47	28	28
93.30	32°50.0'	117°30.3'	IX-8	1436	1451	548	0-140	33	33
93.35	32°39.8'	117°51.0'	IX-8	1726	1741	483	0-129	93	93
93.40	32°30.0'	118°11.7'	IX-8	1946	2001	460	0-140	200	200
93.45	32°20.0'	118°33.0'	IX-8	2211	2226	537	0-117	140	140
93.50	32°09.6'	118°55.5'	IX-9	0036	0051	454	0-134	101	101
97.30	32°14.1'	117°07.0'	IX-9	1633	1640	215	0-68	56	56
97.32	32°08.5'	117°11.0'	IX-9	1501	1516	488	0-133	57	57
97.40	31°54.6'	117°46.5'	IX-9	1021	1036	497	0-141	60	60
97.45	31°45.3'	118°16.0'	IX-9	0716	0731	464	0-142	121	121
97.50	31°35.5'	118°34.0'	IX-9	0446	0501	518	0-128	87	87
100.29	31°42.0'	116°43.0'	IX-1	1118	1126	247	0-70	73	73
100.30	31°40.5'	116°46.5'	IX-1	1021	1036	477	0-138	40	40
100.35	31°29.0'	117°05.0'	IX-1	0816	0830	438	0-139	37	37
100.40	31°22.5'	117°23.5'	IX-1	0621	0636	477	0-140	59	59
100.45	31°11.5'	117°44.5'	IX-1	0351	0406	478	0-142	84	84
100.50	31°01.0'	118°06.0'	IX-1	0026	0040	502	0-135	121	121
100.60	30°40.5'	118°47.0'	VIII-31	1946	2001	475	0-138	67	67
100.70	30°20.5'	119°28.0'	VIII-31	1426	1441	465	0-139	52	52
100.80			Not occupied						
103.30	31°05.0'	116°25.5'	VIII-30	1913	1920	240	0-52	83	83
103.35	30°55.0'	116°45.5'	VIII-30	2141	2156	456	0-138	118	118
103.40	30°46.0'	117°04.0'	VIII-31	0011	0026	470	0-140	94	94
107.32	30°25.7'	116°11.0'	VIII-30	1421	1436	461	0-142	65	65
107.35	30°20.5'	116°23.5'	VIII-30	1211	1226	494	0-135	73	73
107.40	30°11.0'	116°42.0'	VIII-30	0956	1010	414	0-148	128	128
110.33	29°50.5'	115°52.0'	VIII-29	0913	0920	261	0-69	84	84
110.35	29°46.0'	115°59.5'	VIII-29	1036	1051	462	0-145	104	104
110.40	29°36.5'	116°17.5'	VIII-29	1306	1320	459	0-146	122	122
110.45	29°26.0'	116°39.0'	VIII-29	1631	1646	458	0-148	68	68
110.50	29°16.5'	116°58.5'	VIII-29	1906	1920	464	0-144	198	175
110.60	28°57.0'	117°38.5'	VIII-29	2336	2351	487	0-143	107	107
113.30	29°22.0'	115°17.0'	VIII-29	0353	0400	236	0-56	614	614
113.35	29°10.5'	115°37.5'	VIII-28	2331	2345	548	0-132	69	69
113.40	29°02.0'	115°58.5'	VIII-28	2021	2036	492	0-144	195	195

Plankton Volumes, Cruise 5408, August 1954 (cont'd)

Position				Time (PST)		Vol. water strained	Depth of haul	Vol.per 1000 C.M.strained	
			(1954)					Total	Sm.org.
Sta.	N.lat.	W.long.	Date	Start	End	C.M.	in meters	cc.	cc.
117.26	28°56.0'	114°41.0'	VIII-27	0643	0650	270	0-63	89	89
117.30	28°48.0'	114°56.5'	VIII-27	0838	0847	286	0-84	140	140
117.35	28°38.0'	115°16.0'	VIII-27	1401	1416	515	0-134	113	113
117.40	28°27.0'	115°35.0'	VIII-27	1636	1650	490	0-142	208	192
120.25	28°23.5'	114°15.5'	VIII-27	0038	0044	206	0-47	24	24
120.30	28°11.0'	114°38.0'	VIII-26	2113	2121	304	0-75	76	76
120.35	28°02.5'	114°54.0'	VIII-25	2103	2111	260	0-68	96	96
120.45	27°41.0'	115°37.0'	VIII-25	1526	1540	413	0-151	111	111
120.50	27°33.0'	115°52.0'	VIII-25	1206	1221	486	0-138	66	66
120.60	27°13.0'	116°30.0'	VIII-25	0721	0735	454	0-145	44	44
120.70	26°52.5'	117°10.0'	VIII-25	0146	0200	490	0-146	69	69
120.80	26°33.0'	117°48.0'	VIII-24	2106	2120	490	0-140	75	75
120.90	26°12.5'	118°27.0'	VIII-24	1526	1540	490	0-141	47	47
123.37	27°24.0'	114°39.5'	VIII-23	1508	1516	254	0-69	472	472
123.40	27°18.0'	114°52.0'	VIII-23	1656	1710	433	0-144	291	291
123.45	27°07.5'	115°12.0'	VIII-23	2016	2031	454	0-138	119	119
123.50	26°58.0'	115°31.0'	VIII-23	2256	2311	434	0-145	129	129
127.34	26°56.0'	114°07.5'	VIII-23	1023	1031	239	0-69	452	452
127.40	26°43.0'	114°30.0'	VIII-23	0701	0715	474	0-134	296	279
127.45	26°28.0'	114°49.0'	VIII-23	0350	0406	477	0-141	172	172
127.50	26°21.0'	115°10.5'	VIII-23	0026	0040	495	0-137	117	101
130.30	26°26.0'	113°32.0'	VIII-22	0213	0221	243	0-72	136	136
130.35	26°17.0'	113°49.5'	VIII-22	0436	0450	502	0-135	100	100
130.40	26°09.0'	114°07.5'	VIII-22	0711	0725	316	0-147	222	222
130.45	25°59.5'	114°29.0'	VIII-22	1041	1056	413	0-141	104	104
130.50	25°50.5'	114°46.5'	VIII-22	1301	1316	396	0-143	68	68
130.60	25°31.5'	115°24.0'	VIII-22	1718	1732	466	0-146	324	251
133.25	26°04.5'	112°48.0'	VIII-21	2028	2036	263	0-69	312	312
133.30	25°54.5'	113°07.0'	VIII-21	1716	1730	454	0-145	49	49
133.35	25°44.5'	113°26.0'	VIII-21	1426	1440	430	0-142	56	56
133.40	25°34.0'	113°45.5'	VIII-21	1151	1206	343	0-148	239	239
137.23	25°34.2'	112°18.5'	VIII-21	0228	0245	297	0-41	708	708
137.30	25°20.0'	112°45.5'	VIII-21	0556	0610	503	0-138	235	235

Plankton Volumes, Cruise 5410, October 1954

77.50	35°04.0'	120°52.0'	X-6	1821	1835	429	0-122	385	385
77.55	34°54.0'	121°13.0'	X-6	1436	1451	573	0-112	321	321
80.51	34°26.0'	120°33.0'	X-7	1347	1358	383	0-96	159	159
80.55	34°19.0'	120°48.0'	X-7	1626	1641	467	0-145	334	334
80.60	34°09.0'	121°09.0'	X-7	2001	2016	441	0-145	215	215
80.70	33°47.0'	121°48.0'	X-8	0051	0106	405	0-150	197	197
80.80	33°26.0'	122°32.0'	X-8	0826	0840	432	0-136	250	201
80.90	33°09.0'	123°13.0'	X-8	1311	1326	473	0-147	44	44
82.47	34°15.0'	119°58.0'	X-9	1656	1711	450	0-139	100	100

Plankton Volumes, Cruise 5410, October 1954 (cont'd)

Position				Time (PST)		Vol. water strained	Depth of haul	Vol.per 1000 C.M.strained	
Sta.	N.lat.	W.long.	(1954) Date	Start	End	C.M.	in meters	Total cc.	Sm.org. cc.
83.40	34°13.5'	119°22.0'	X-9	2344	2347	86	0-20	5	5
83.43	34°05.5'	119°35.5'	X-9	2143	2150	254	0-65	228	228
83.48	33°57.5'	119°55.0'	X-9	1418	1427	282	0-75	96	96
83.51	33°51.0'	120°08.0'	X-9	1136	1150	416	0-143	77	77
83.55	33°43.5'	120°24.0'	X-9	0911	0925	446	0-151	191	191
83.60	33°35.0'	120°47.0'	X-9	0456	0511	476	0-140	113	99
85.39	33°59.0'	119°05.5'	X-10	0146	0201	469	0-136	111	111
85.40	33°57.0'	119°10.0'	X-10	0316	0331	469	0-141	132	132
85.45	33°47.0'	119°31.0'	X-10	0606	0621	441	0-130	245	245
85.50	33°37.0'	119°52.0'	X-10	0936	0950	358	0-131	198	198
85.55	33°27.0'	120°12.0'	X-10	1221	1236	383	0-147	183	183
85.60	33°15.5'	120°36.5'	X-10	1551	1606	454	0-140	238	238
87.35	33°51.5'	118°36.5'	X-11	0906	0920	531	0-131	49	49
87.40			Occupied. Sample not quantitative						
87.45	33°30.0'	119°19.0'	X-11	0316	0330	482	0-138	299	299
87.50	33°20.0'	119°40.0'	X-11	0046	0053	246	0-70	398	398
87.55	33°10.0'	120°00.5'	X-10	2146	2200	479	0-129	503	338
87.60	33°00.0'	120°21.0'	X-10	1816	1831	464	0-139	220	207
90.28	33°28.5'	117°45.5'	X-12	1138	1146	302	0-79	46	46
90.30	33°24.0'	117°54.5'	X-12	1306	1321	444	0-139	90	90
90.37	33°10.5'	118°23.0'	X-12	1631	1646	465	0-133	80	80
90.45	32°54.5'	118°56.0'	X-12	2056	2110	454	0-131	152	152
90.50	32°44.0'	119°16.0'	X-12	2348	2356	239	0-66	209	209
90.55	32°34.0'	119°36.5'	X-13	0226	0241	467	0-128	229	203
90.60	32°24.0'	119°57.0'	X-13	0506	0521	456	0-146	243	243
90.70	32°05.0'	120°38.0'	X-13	0941	0956	459	0-142	92	92
93.27	32°56.0'	117°19.0'	X-14	1028	1036	230	0-67	118	118
93.30	32°50.0'	117°31.0'	X-14	0816	0830	460	0-136	89	89
93.40	32°30.5'	118°12.5'	X-14	0346	0401	456	0-136	149	149
93.45	32°20.0'	118°33.0'	X-14	0106	0121	483	0-128	132	132
93.50	32°10.0'	118°53.0'	X-13	2136	2150	428	0-140	91	91
93.55	32°00.5'	119°13.5'	X-13	1856	1911	459	0-148	148	148
97.30	32°15.5'	117°09.0'	X-14	1516	1521	151	0-48	159	159
97.32	32°11.5'	117°17.0'	X-14	1611	1626	382	0-142	73	73
97.40	31°55.5'	117°50.0'	X-14	1956	2010	406	0-139	126	126
97.45	31°45.0'	118°10.0'	X-14	2256	2310	446	0-128	144	144
97.50	31°35.0'	118°30.0'	X-15	0126	0141	337	0-140	101	101
97.55	31°25.0'	118°51.0'	X-15	0356	0411	379	0-142	121	121
100.29	31°42.0'	116°43.5'	X-17	0048	0056	306	0-81	72	72
100.30	31°40.5'	116°46.5'	X-16	2356	0011	434	0-136	67	67
100.40	31°21.0'	117°27.0'	X-16	1901	1915	466	0-142	129	129
100.45	31°10.5'	117°47.0'	X-16	1636	1650	438	0-141	71	71
100.50	31°02.0'	118°05.0'	X-16	1341	1356	450	0-149	40	40
100.55	30°52.5'	118°26.5'	X-16	1126	1140	423	0-144	80	80
100.60	30°42.0'	118°48.0'	X-16	0826	0840	485	0-145	49	49

Plankton Volumes, Cruise 5410, October 1954 (cont'd)

Position				Time (PST)		Vol. water strained	Depth of haul	Vol.per 1000 C.M.strained	
Sta.	N.lat.	W.long.	(1954) Date	Start	End	C.M.	in meters	Total cc.	Sm.org. cc.
100.70	30°22.0'	119°28.0'	X-16	0346	0401	484	0-140	105	105
100.80	30°01.5'	120°08.0'	X-15	2316	2331	484	0-147	45	45
100.90	29°41.0'	120°48.0'	X-15	1801	1816	479	0-141	31	31
103.30	31°05.5'	116°24.2'	X-24	0704	0709	237	0-33	793	793
103.35	30°55.3'	116°44.8'	X-24	0911	0925	510	0-118	121	121
103.40	30°45.5'	117°05.2'	X-24	1229	1244	457	0-132	53	53
107.32	30°25.8'	116°11.0'	X-24	0156	0211	450	0-145	113	113
107.35	30°22.0'	116°23.3'	X-24	0031	0046	466	0-138	195	195
107.40	30°11.6'	116°45.0'	X-23	2126	2140	456	0-129	136	136
110.33	29°51.6'	115°52.5'	X-22	2243	2251	346	0-63	318	318
110.35	29°47.0'	116°01.0'	X-22	2331	2346	470	0-122	113	113
110.40	29°37.0'	116°19.7'	X-23	0305	0320	412	0-145	158	158
110.45	29°25.8'	116°41.0'	X-23	0541	0555	511	0-140	145	133
110.50	29°16.5'	116°59.0'	X-23	0736	0750	478	0-136	36	36
110.55	29°00.0'	117°25.0'	X-23	1006	1020	479	0-129	54	54
110.60	29°00.0'	117°38.0'	X-23	1233	1248	413	0-138	92	92
113.30	29°25.0'	115°19.2'	X-22	1759	1804	166	0-43	157	157
113.35	29°13.0'	115°38.8'	X-22	1521	1536	480	0-126	114	114
113.40	29°03.4'	115°58.0'	X-22	1216	1231	420	0-140	145	145
117.26	28°52.5'	114°38.8'	X-22	0038	0046	249	0-65	329	329
117.30	28°48.0'	114°56.5'	X-22	0304	0313	340	0-62	162	162
117.35	28°36.6'	115°17.0'	X-22	0506	0521	594	0-88	246	246
117.40	28°29.0'	115°35.7'	X-22	0800	0814	510	0-112	358	358
120.25	28°21.5'	114°21.0'	X-21	2034	2039	233	0-28	206	206
120.30	28°13.0'	114°34.0'	X-21	1758	1806	257	0-66	315	315
120.35	28°03.0'	114°54.0'	X-21	1548	1556	359	0-37	186	170
120.45	27°43.0'	115°33.0'	X-20	2326	2340	464	0-134	496	293
120.50	27°33.2'	115°52.8'	X-20	2116	2130	526	0-103	304	304
120.55				Occupied. Sample not quantitative					
120.60	27°13.5'	116°30.2'	X-20	1536	1551	399	0-147	286	261
120.70	26°46.4'	117°06.7'	X-20	1101	1116	465	0-124	191	191
120.80	26°38.4'	117°46.5'	X-20	0601	0616	439	0-146	89	89
120.90	26°15.0'	118°27.0'	X-20	0124	0139	489	0-143	119	119
123.37	27°24.0'	114°39.5'	X-19	0028	0035	238	0-56	164	164
123.40	27°18.0'	114°52.0'	X-19	0226	0241	445	0-145	427	283
123.45	27°07.5'	115°11.5'	X-19	0441	0455	471	0-135	85	85
123.50	26°56.5'	115°30.0'	X-19	0656	0711	435	0-141	124	124
123.55	26°47.0'	115°47.5'	X-19	1008	1022	466	0-141	71	71
127.34				Occupied. Sample not quantitative					
127.40	26°47.5'	114°29.5'	X-18	1741	1755	433	0-146	252	210
127.45	26°34.0'	114°54.0'	X-18	1426	1441	462	0-136	138	113
127.50	26°22.5'	115°09.0'	X-18	1216	1231	605	0-96	147	147
127.55	26°12.5'	115°27.0'	X-18	0911	0924	449	0-141	566	544
130.30	26°29.0'	113°27.5'	X-17	1223	1230	267	0-36	146	146
130.35	26°19.5'	113°45.0'	X-17	1427	1438	464	0-74	82	82

Plankton Volumes, Cruise 5410, October 1954 (cont'd)

Position			(1954)	Time (PST)		Vol. water strained	Depth of haul	Vol.per 1000 C.M.strained	
Sta.	N.lat.	W.long.	Date	Start	End	C.M.	in meters	Total cc.	Sm.org. cc.
130.40	26°10.8'	114°03.7'	X-17	1741	1755	491	0-128	220	220
130.45	25°59.0'	114°27.0'	X-17	2016	2031	463	0-140	311	252
130.50	25°49.2'	114°46.5'	X-17	2236	2250	464	0-143	306	168
130.55	25°40.5'	115°07.0'	X-18	0056	0111	444	0-149	311	311
130.60	25°30.5'	115°27.5'	X-18	0504	0519	550	0-104	351	315
133.25	26°05.0'	112°47.5'	X-17	0758	0805	297	0-54	78	78
133.30	25°49.5'	113°07.0'	X-17	0546	0601	582	0-108	76	76
137.23	25°35.0'	112°19.0'	X-16	2208	2216	389	0-38	105	105
137.30	25°20.5'	112°45.0'	X-17	0056	0111	480	0-140	146	146
				Plankton Volumes, Cruise 5412, December 1954					
80.51	34°27.5'	120°33.0'	XII-2	1203	1210	255	0-68	47	47
80.55	34°21.5'	120°50.0'	XII-2	1506	1521	419	0-144	67	67
80.60	34°09.0'	121°09.0'	XII-2	1751	1806	452	0-142	111	111
80.70	33°50.5'	121°51.0'	XII-2	0011	0026	496	0-129	103	103
80.80	33°33.0'	122°31.0'	XII-3	0441	0456	498	0-139	205	205
80.90	33°14.0'	123°12.0'	XII-3	1026	1041	457	0-144	39	39
82.47	34°16.0'	119°58.0'	XII-4	1056	1111	449	0-145	82	82
83.40	34°14.0'	119°21.5'	XII-4	1619	1622	88	0-13	68	68
83.43	34°08.5'	119°33.5'	XII-4	1437	1449	403	0-109	94	94
83.48	33°58.0'	119°54.5'	XII-4	0741	0756	412	0-147	75	75
83.51	33°51.5'	120°08.0'	XII-4	0531	0546	453	0-144	71	71
83.55	33°43.5'	120°24.0'	XII-4	0231	0245	464	0-138	241	185
83.60	33°34.0'	120°44.5'	XII-3	0001	0016	472	0-137	210	210
85.39	33°59.0'	119°04.0'	XII-4	2021	2036	480	0-136	92	92
85.40	33°57.5'	119°10.5'	XII-4	2121	2136	470	0-137	96	96
85.45	33°47.0'	119°31.5'	XII-4	0046	0101	451	0-138	120	120
85.50	33°37.0'	119°52.0'	XII-5	0331	0346	439	0-139	109	109
85.55	33°26.5'	120°13.5'	XII-5	0716	0731	456	0-135	59	59
85.60	33°17.0'	120°33.5'	XII-5	0941	0956	466	0-132	105	105
87.35	33°51.0'	118°38.5'	XII-6	0406	0421	477	0-135	92	92
87.40	33°40.0'	118°58.5'	XII-6	0106	0121	450	0-141	96	96
87.45	33°30.0'	119°18.5'	XII-5	2116	2131	458	0-142	98	98
87.50	33°20.0'	119°39.5'	XII-5	1848	1855	236	0-61	115	115
87.55	33°10.0'	120°00.5'	XII-5	1521	1536	451	0-143	2014	106
87.60	33°00.0'	120°21.5'	XII-5	1251	1306	416	0-142	31	31
90.28	33°28.5'	117°46.7'	XII-6	1026	1041	494	0-127	30	30
90.30	33°24.5'	117°55.0'	XII-6	1146	1201	463	0-136	56	56
90.37	33°11.0'	118°23.5'	XII-7	0416	0431	442	0-145	111	111
90.45	32°55.0'	118°56.0'	XII-7	0811	0826	418	0-147	105	105
90.50	32°45.5'	119°16.5'	XII-7	1201	1216	419	0-140	79	79
90.60	32°25.0'	119°56.0'	XII-7	1735	1751	466	0-134	135	135
90.70	32°05.0'	120°38.0'	XII-7	0036	0051	460	0-146	161	161
93.27	32°56.0'	117°19.0'	XII-9	0046	0101	453	0-139	77	77

Plankton Volumes, Cruise 5412, December 1954 (cont'd)

Sta.	Position N.lat.	W.long.	(1954) Date	Time (PST) Start	End	Vol. water strained C.M.	Depth of haul in meters	Vol.per 1000 C.M.strained Total cc.	Sm.org. cc.
93.30	32°49.5'	117°31.0'	XII-8	2146	2201	482	0-139	52	52
93.40	32°30.0'	118°12.5'	XII-8	1556	1611	442	0-141	68	68
93.50	32°08.0'	118°55.0'	XII-8	1111	1126	437	0-142	55	55
97.30	32°15.0'	117°08.5'	XII-9	0542	0549	211	0-49	109	109
97.32	32°11.5'	117°16.0'	XII-9	0701	0716	429	0-136	51	51
97.40	31°55.5'	117°50.0'	XII-9	1126	1141	430	0-134	51	51
97.50	31°34.5'	118°29.0'	XII-9	1606	1621	413	0-146	73	73
100.29	31°42.0'	116°43.5'	XII-11	2017	2027	301	0-89	299	299
100.30	31°40.5'	116°46.5'	XII-11	1901	1916	455	0-135	110	110
100.40	31°23.5'	117°26.0'	XII-11	1416	1431	419	0-143	57	57
100.50	Occupied. Sample not quantitative								
100.60	30°42.5'	118°44.5'	XII-11	0316	0331	432	0-145	62	62
100.70	30°20.5'	119°27.0'	XII-10	2201	2216	391	0-145	51	51
100.80	Occupied. Sample not quantitative								
100.90	29°41.0'	120°47.0'	XII-10	1131	1146	400	0-148	83	83
103.30	31°06.0'	116°25.0'	XII-12	0928	0935	189	0-54	159	159
103.35	30°55.0'	116°45.0'	XII-12	0626	0641	440	0-136	43	43
103.40	30°45.0'	117°05.5'	XII-12	0351	0406	445	0-137	38	38
107.32	30°26.0'	116°11.0'	XII-12	1406	1421	454	0-135	269	256
107.35	30°22.0'	116°19.0'	XII-12	1626	1641	420	0-142	52	52
107.40	30°10.0'	116°43.0'	XII-12	1926	1941	419	0-142	95	43
110.33	29°50.0'	115°52.4'	XII-13	2058	2106	259	0-74	143	143
110.35	29°46.0'	116°00.0'	XII-13	1926	1941	487	0-136	131	131
110.40	29°36.0'	116°19.5'	XII-13	1636	1651	444	0-141	56	56
110.50	29°17.5'	117°00.0'	XII-13	1051	1106	441	0-138	54	54
110.60	28°56.5'	117°39.0'	XII-13	0611	0626	429	0-144	131	131
113.30	29°23.0'	115°19.0'	XII-16	1458	1505	211	0-50	265	265
113.35	29°07.0'	115°33.0'	XII-16	1106	1121	517	0-122	327	327
113.40	28°56.0'	115°55.0'	XII-16	0741	0755	520	0-120	108	108
113.50	28°39.0'	116°36.0'	XII-16	0121	0136	412	0-142	352	311
113.60	28°24.0'	117°15.0'	XII-15	1906	1921	462	0-136	100	78
117.26	28°56.0'	114°40.0'	XII-14	1613	1621	257	0-62	23	23
117.30	28°48.0'	114°56.0'	XII-14	1852	1902	318	0-88	674	674
117.35	28°39.0'	115°16.0'	XII-14	2226	2240	516	0-122	182	81
117.40	28°29.0'	115°37.0'	XII-15	0141	0156	440	0-142	175	120
117.50	28°09.0'	116°16.0'	XII-15	0826	0841	520	0-120	478	478
117.60	27°54.0'	116°51.0'	XII-15	1336	1351	452	0-138	124	124
120.25	28°22.0'	114°17.0'	XII-14	1045	1053	301	0-56	20	20
120.30	28°15.0'	114°28.0'	XII-14	0843	0851	314	0-61	13	13
120.35	28°03.0'	114°50.0'	XII-14	0453	0501	244	0-74	590	590
120.40	27°56.0'	115°17.0'	XII-14	0058	0104	191	0-58	167	167
120.45	27°42.0'	115°32.0'	XII-13	2131	2145	500	0-121	88	68
120.50	27°32.0'	115°57.0'	XII-13	1811	1826	458	0-134	70	70
120.60	27°08.0'	116°25.0'	XII-13	0941	0956	544	0-126	118	118

Plankton Volumes, Cruise 5412, December 1954 (cont'd)

Position				Time (PST)		Vol. water strained	Depth of haul	Vol.per 1000 C.M.strained	
			(1954)					Total	Sm.org.
Sta.	N. lat.	W.long.	Date	Start	End	C.M.	in meters	cc.	cc.
120.70	26°49.0'	117°08.0'	XII-13	0026	0040	458	0-135	96	96
120.80	26°29.0'	117°53.0'	XII-12	1721	1735	437	0-131	69	69
120.90	26°17.0'	118°24.0'	XII-12	1021	1035	480	0-133	46	46
123.37	27°24.0'	114°40.0'	XII-11	0148	0155	221	0-61	68	68
123.40	27°18.0'	114°53.0'	XII-11	0416	0431	506	0-121	75	75
123.45	27°11.0'	115°12.0'	XII-11	0826	0840	444	0-133	108	70
123.50	27°03.0'	115°32.0'	XII-11	1146	1201	394	0-138	76	76
123.55	26°53.0'	115°50.0'	XII-11	1501	1516	407	0-145	98	98
127.34	26°56.0'	114°09.0'	XII-10	1923	1931	306	0-71	85	85
127.40	26°45.0'	114°30.0'	XII-10	1536	1551	477	0-141	96	96
127.45	26°30.0'	114°48.0'	XII-10	1206	1220	488	0-134	78	78
127.50	26°23.0'	115°03.0'	XII-10	0846	0901	471	0-130	64	64
127.55	26°12.0'	115°22.0'	XII-10	0516	0530	486	0-132	66	66
130.30	26°31.0'	113°26.0'	XII-9	0015	0022	272	0-67	331	331
130.35	26°21.0'	113°48.0'	XII-9	0411	0426	477	0-138	126	126
130.40	26°11.0'	114°08.0'	XII-9	0726	0740	455	0-138	42	42
130.50	25°48.0'	114°44.0'	XII-9	1531	1546	446	0-136	81	81
130.60	25°29.0'	115°23.0'	XII-9	2121	2135	511	0-125	100	78
133.25	26°03.0'	112°48.0'	XII-8	1443	1451	300	0-70	140	140
133.30	25°54.0'	113°07.0'	XII-8	1806	1821	490	0-135	82	65
137.23	25°37.0'	112°20.0'	XII-8	0853	0901	313	0-57	105	105
137.30	25°24.0'	112°41.0'	XII-8	0511	0526	437	0-139	78	78
140.30	24°47.0'	112°25.0'	XII-7	2328	2337	363	0-78	187	132
140.35	24°37.0'	112°43.0'	XII-7	1931	1945	483	0-131	46	46
140.40	24°26.0'	113°02.0'	XII-7	1616	1631	472	0-135	28	28
143.26	24°18.0'	111°48.0'	XII-7	0348	0357	352	0-67	51	51
143.30	24°14.0'	112°04.0'	XII-7	0611	0626	475	0-136	50	50
143.35	24°00.0'	112°25.0'	XII-7	0956	1011	477	0-126	42	42
147.20	23°58.0'	111°01.0'	XII-6	2113	2122	357	0-74	78	78
147.25	23°48.0'	111°22.0'	XII-6	1806	1820	445	0-131	85	54
147.30	23°35.0'	111°47.0'	XII-6	1346	1401	490	0-130	37	37
150.19	22°24.0'	110°39.0'	XII-5	2316	2331	540	0-126	89	89
150.25	23°14.0'	111°02.0'	XII-6	0316	0331	548	0-129	55	55
150.30	23°02.0'	111°18.0'	XII-6	0746	0801	502	0-129	16	16
153.16	22°54.0'	110°06.0'	XII-5	1626	1641	494	0-143	12	12
153.20	22°49.0'	110°17.0'	XII-5	1441	1456	482	0-135	27	27
153.30	22°25.0'	111°02.0'	XII-5	0701	0716	497	0-140	537	386
157.10	22°35.0'	109°19.0'	XII-4	1151	1205	568	0-119	39	39
157.20	22°15.0'	110°04.0'	XII-4	1831	1846	481	0-136	83	66
157.30	21°52.0'	110°38.0'	XII-5	0051	0106	500	0-136	68	68

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